

TECHNICAL MEMORANDUM

DATA GAP INVESTIGATION REPORT - 2020

International Paper Company
Closed Former Wood Treating Site Units
Wiggins, Mississippi
MSD 980 600 084

PREPARED FOR: International Paper Company
6400 Poplar Avenue
Memphis, Tennessee

US EPA Region 4

COPY TO: Mississippi Department of Environmental Quality

PREPARED BY: EarthCon Consultants, Inc.

DATE: August 10, 2020

REGISTERED PROFESSIONAL GEOLOGIST STATEMENT

I have reviewed this document in sufficient depth to accept full responsibility for its contents related to the geologic discussion/data/information contained herein.



August 10, 2020

Norman D. Kennel, RPG #0681
EarthCon Consultants, Inc.

Date

INTRODUCTION

This report presents the results of additional investigation activities conducted in June 2020 at the International Paper Company (IP) Closed Former Wood Treating Site in Wiggins, Mississippi (Wiggins facility).

A meeting and site tour were held at the Wiggins facility on December 10, 2019. Meeting attendees included US Environmental Protection Agency (EPA), Mississippi Department of Environmental Quality (MDEQ), IP and EarthCon Consultants, Inc. (EarthCon) personnel. The discussion during the meeting included EPA's concern that elevated concentrations of dissolved wood treating chemical constituents or dense non-aqueous phase liquids (DNAPL) may exist hydraulically downgradient from the closed units/treatment areas at the bottom of the Citronelle/top of the Pascagoula formations. The top of the

Pascagoula formation is an aquitard, consisting of clay; therefore, DNAPL, if present may collect in this zone. Although such conditions have previously been investigated and shown not to be present, several activities were discussed with EPA to further evaluate the potential for DNAPL, and IP agreed to prepare a Data Gap Investigation Work Plan (Work Plan) for EPA review following the meeting.

On January 29, 2020 IP submitted a Work Plan to EPA (**Attachment 1**). The Work Plan elements included the following activities:

- Installation of a “well cluster” in the area between wells WC-40 and WC-44
 - One well to be screened similarly to WC-40
 - The second, deeper well to be screened at the bottom of the Citronelle/top of Pascagoula formations
- Redevelop, purge, and sample existing “deep wells”:
 - WC-43
 - WC-08A
 - WCP-8
 - WP-01
 - WP-02
- Abandon three shallow wells which were observed inside the closed treatment impoundment area (SWMUs 8, 9 and 10) during the site tour. The wells were examined during the site visit and were found to be approximately 40 feet deep. IP searched available records regarding well installation/construction, functionality and/or intended use of the wells and was unable to locate any information regarding these three wells. Given the location of these wells within the closed units, these wells did not appear to be useful for monitoring the groundwater plume and migration/plume stability and thus they were proposed for abandonment.

The Work Plan was approved by EPA on February 26, 2020. Due to restrictions, and concerns surrounding the COVID-19 pandemic, the field work could not be implemented until the week of June 15, 2020.

The location of the Wiggins facility is shown on **Figure 1**. **Figure 2** shows site features and groundwater monitoring well locations. The results of the June 2020 field activities are summarized in this report as well as documented in the following attachments:

Table 1.	Monitoring Well Completion Data
Table 2.	MDEQ Permit Monitoring Parameters/GWPS
Table 3.	Laboratory Analytical Results Summary – Permit Wells - June 2020
Table 4.	Laboratory Analytical Results Summary – Work Plan Wells - June 2020
Table 5.	Water Level Data - June 2020
Figure 1.	Site Location Map
Figure 2.	Wiggins Facility Site Map
Figure 3.	Potentiometric Surface Map (June 2020)
Figure 4.	Naphthalene Iso-contour lines near WC-40
Attachment 1.	Data Gap Work Plan
Attachment 2.	Photolog
Attachment 3.	Soil Boring/Well Construction Logs/Well Abandonment Reports
Attachment 4.	June 2020 Laboratory Analytical Reports
Attachment 5.	June 2020 Laboratory Data Quality Assurance Review Memoranda
Attachment 6.	Plume Stability Analysis Update Summary

MONITORING WELL INSTALLATION, DEVELOPMENT AND WELL ABANDONMENT

A monitoring well cluster, consisting of two wells designated WC-56 and WC-57 was installed in an area between monitoring wells WC-40 and WC-44 as shown on **Figure 2**. The purpose of the two new monitoring wells was to assess potential concentrations of creosote constituents and pentachlorophenol (PCP) in and at the bottom of the Citronelle aquifer downgradient from monitoring well WC-40.

The boreholes were drilled using rotary sonic drilling methods by advancing 10-foot long sections of 4.5-inch outer diameter (OD) inner casing and 6.5-inch OD outer casing sonic rods. The 4.5-inch OD rods were advanced 10 feet, then the 6.5-inch OD rods were advanced over the smaller rods to the same depth. The 4.5-inch OD rod was then retrieved to collect the recovered soil core sample. This process was repeated at 10-foot intervals until the desired depth was reached. The larger-diameter sonic rods remained in the borehole and acted as an outer casing until the monitoring well was constructed.

The initial borehole, designated WC-57 was advanced to the contact of the Citronelle and Pascagoula formations (the top of the latter formation is referred to as the Pascagoula clay), at a depth of 142 feet below ground surface (bgs). Soil sample cores were retrieved from the borehole at 10-foot intervals and the samples were placed in a polyethylene sleeve which was placed on a plastic sheet and then cut open. The sample cores were observed, classified, and logged by the on-site geologist. Representative photos of the soil cores are contained in the photolog in **Attachment 2**. The second borehole, designated WC-56 and located approximately 15 feet north of WC-57 was advanced to a total depth of 105' bgs, to match the well construction of WC-40. Soil sample cores were not retrieved from the second boring, as the soil cores from WC-57 were used for logging and well placement purposes.

After reaching the terminal depth of each borehole, groundwater monitoring wells were constructed in each borehole as the larger-diameter sonic rods were retrieved. The monitoring wells were constructed of rigid poly-vinyl chloride (PVC), each with a 10-foot section of screen with 0.010-inch slots. A 20-40 sand filter pack was installed around the screened section to approximately two to three feet above the top of the screen, followed by approximately two to three feet of bentonite pellets. The remainder of the annular space surrounding the riser in each well was filled with grout after the bentonite had hydrated. Each well was completed at the surface with a load-rated monitoring well vault. Soil boring/well construction logs are contained in **Attachment 3**.

After a minimum of 24 hours following well installation, each well was developed with a submersible pump to remove residual materials remaining in the wells and to attempt to re-establish the natural hydraulic flow conditions of the formation around the wells. The wells were developed until the column of water in the well was reasonably free of visible sediment.

The three monitoring wells observed inside the closed treatment impoundment area were abandoned. In addition, two monitoring wells (WC-49I and WC-50I) which were installed in 2007 and were used for chemical injection during the 2008 *In Situ* Chemical Oxidation (ISCO) pilot study were also abandoned¹. (see **Attachment 3** for well abandonment forms).

The location and casing elevation for WC-56, WC-57 as well as several other wells lacking complete survey information were surveyed by a Mississippi-registered surveyor, and the information was added to the site's well network database (summarized in **Table 1**).

¹ Note WC-49I and WC-50I were wells installed during the 2007/2008 ISCO Pilot Study. Groundwater monitoring wells WC-49i and WC-50i, which were installed during the 2011 CAP, remain at the site.

GROUNDWATER SAMPLING

Groundwater samples were collected from the MDEQ Permit-required semi-annual monitoring event wells (WC-8, WC-11, WC-26, WC-39, WC-41, and WC-44), from WC-56, WC-57, and from five additional existing “deep” wells in the vicinity of the closed impoundments (WC-43, WC-08A, WCP-8, WP-01 and WP-02).

Existing monitoring wells WC-43, WC-08A, WCP-8, WP-1, and WP-2 and the new wells WC-56 and WC-57 were developed with a submersible pump until sediment accumulated in the bottom of each well, if any, had been removed and the recovered water was reasonably free of sediment. Prior to development and again prior to sampling, an oil/water interface probe was used to measure the depth to water, the potential presence of light and dense non-aqueous phase-separated layers (LNAPL and DNAPL), and the total depth of each well. Neither LNAPL nor DNAPL was observed in any of the wells accessed during the June 2020 field activities. A potentiometric surface map for the Citronelle Formation (using data from the MDEQ Permit-required wells) is included as **Figure 3**.

The monitoring wells were purged and sampled using the low-flow method described in the EPA Region 4, Science and Ecosystem Support Division, Operating Procedure SESDPROC-301-R4, Groundwater Sampling. Field parameter data including pH, specific conductance, temperature, dissolved oxygen, turbidity, and oxidation-reduction potential were measured during purging and samples were collected after measurements stabilized.

The Work Plan contemplated that a packer would be installed in monitoring wells with screen lengths greater than 10 feet (i.e. WCP-8, WC-08A and WP-2) prior to purging/sampling activities in an attempt to isolate the bottom of the screened interval during sampling.

- Upon review of well construction information, it was determined that WCP-8 was constructed with 25 feet of 6-inch diameter PVC well screen. EarthCon was advised by equipment suppliers contacted that there would be a risk of well screen damage with inflatable packer usage (i.e. due to the larger diameter of the well, increased pressure would be required which may result in damage to the PVC well screen). WCP-8 was therefore sampled using low-flow methods with the intake of the bladder pump deployed at a depth of 5 feet above the bottom of the well (i.e. half-way within the bottom 10-foot screen interval).
- An inflatable packer was placed and inflated approximately 10 feet above the bottom of the screened interval in monitoring wells WC-08A and WP-2 with the intake of the bladder pump deployed at a depth of 5 feet above the bottom of the well (i.e. half-way within the bottom 10 foot screen interval).
 - WC-08A was successfully sampled using the packer assembly (see representative photo in **Attachment 2**). The packer held an air pressure of 30 pounds per square inch (psi) throughout sampling and no drawdown was observed.
 - WP-2 could not successfully be sampled with the packer assembly due to the well depth and the inability of the bladder pump to successfully deploy at this depth. WP-2 was therefore sampled using low-flow methods with the intake of a variable speed submersible pump deployed at a depth of 5 feet above the bottom of the well (i.e. half-way within the bottom 10-foot screen interval).

LABORATORY RESULTS

The collected groundwater samples were submitted to Pace Analytical National Laboratory in Mt. Juliet, Tennessee for analysis of the following analytes:

- For the MDEQ Permit required wells; 3&4-methylphenol, fluorene, naphthalene, pentachlorophenol, and phenanthrene using Method 8270C SIM.

- For existing monitoring wells WC-43, WC-08A, WCP-8, WP-1, and WP-2 and the new wells (WC-56 and WC-57); the Ground Water Protection Standards (GWPS) constituents listed in the MDEQ permit using EPA Methods 8260B and 8270C.

Quality control (QC) samples consisted of equipment blanks, duplicate samples, and matrix spike/matrix spike duplicates. The laboratory analytical reports are contained in **Attachment 4**.

The laboratory results were reviewed and validated (**Attachment 5**), and the validated results were compared to the GWPS. The groundwater sampling results are summarized in **Table 3**, (Permit Required Wells) and **Table 4** (Work Plan Wells).

The analytical results for the groundwater samples collected from the MDEQ Permit Required Wells were all non-detect except for PCP in WC-26 where it was detected at a concentration of 1.45 ug/L (see **Table 3**).

Several constituents were detected in the Work Plan Wells as summarized in Table 4. Several the detections were reported as “J” flagged results due to their estimated low detection below the Reporting Detection Limit (RDL). Two constituents; PCP and Naphthalene were detected at concentrations above their respective MDEQ Groundwater Protection Standard (GWPS).

- The constituents in the sample collected from well WP-1² were either estimated concentrations below the RDL or non-detected. A low level of PCP was detected in sample WP-1, however, following Functional Guidelines protocols, the concentration, which equaled that of the associated equipment blank (EB-2), was assumed to be a field artifact and was qualified as non-detected.
- Naphthalene was detected in the sample collected from the newly installed WC-57 (and the duplicate sample collected from WC-57) at a concentration of 59.1 ug/L and 41.7 ug/L respectively (the GWPS for naphthalene is 6.2 ug/L).
- All constituents in the samples collected from WP-2 and WC-43 were non-detect.
- All constituents in the sample collected from WC-56 were non-detect except for estimated concentrations below the RDL for Fluoranthene and Phenanthrene.
- All constituents in the sample collected from WC-8A were non-detect except for estimated concentrations below the RDL for PCP and Phenanthrene.

The Groundwater Plume Analytics® evaluation, including a Ricker Method® Plume Stability Analysis (PSA), was updated utilizing site groundwater data through December 2019. The following is provided as a limited summary of the results. The full graphical display and analyses, including plume map videos, center-of-mass (COM) evaluation maps, and the Spatial Change Indicator™ (SCI) results are included in **Attachment 6**.

The plume stability analysis update indicates that from 2011 through 2019 both the naphthalene and PCP plumes are decreasing with strong statistical confidence. The COM evaluation maps depict very little net movement in both constituents over that same time-period indicating that the plumes are not migrating. This is confirmed by the SCI. The SCI for naphthalene, comparing 2011 to 2019, shows attenuation

² A review of the soil/boring well log indicates that WP-1 is likely not screened within the Pascagoula Formation, rather it appears as if it also a well completed within the Citronelle Formation. The top of the Pascagoula formation (as described in other site well logs (i.e. WP-2) and encountered in the soil cores recovered during the drilling of WC-57 is a blue-gray stiff Clay. This material was not noted in the WP-1 well log.

(depicted by blue shading) throughout all parts of the plume except proximal to WC-5. The small portion of pink shading depicted in the SCI is because naphthalene was non-detect in WC-5 in 2011 and was measured at 8.23 µg/L in 2019. However, a plot of the naphthalene trend in WC-5 reveals a strongly decreasing trend in this well that is currently very near the GWPS. The SCI for PCP, comparing 2011 to 2019, depicts attenuation throughout most of the plume with small areas of increase proximal to WC-5, WC-23, WC-29 and WC-30. Individual PCP trend charts are provided for these wells for further context. The WC-5 PCP plot depicts a decreasing trend since approximately 1998 with a brief spike following the 2007 injections. The 2011 date appears to be an uncharacteristically low value similar to what was observed for naphthalene in this well. The WC-23 PCP plot has a similar pattern to WC-5 in that 2011 was the only non-detect event but still depicts a strong decreasing trend. The WC-29 PCP plot also shows a strong decreasing trend over time with a relatively recent increase starting in 2017. This increase appears similar to what occurred in 2002 through 2004 which later returned non-detect values in 2010 and 2011. If further monitoring does not result in a return to low levels, this may be an indication of a localized concentration increase or sourcing in this area. The PCP plot in WC-30, which is proximal to WC-29, depicts a similar increase in concentration starting in 2017 that has currently peaked in 2018. Further sampling of these wells will help reveal if this trend will be sustained or short-term as observed in 2002-2004.

Investigative Derived Waste (IDW) generated during field activities was addressed in accordance with USEPA Operating Procedure SESDPROC-202-R3 "Management of Investigative Derived Waste" (<https://www.epa.gov/sites/production/files/2015-06/documents/Management-of-IDW.pdf>). IDW (i.e., drill cuttings, development/purge water, etc.) was containerized, and the ultimate disposition of the IDW is being evaluated utilizing USEPA Operating Procedure SESDPROC-202-R3.

DISCUSSION

Neither LNAPL nor DNAPL were observed in any of the wells accessed during the June 2020 field activities. Based on potentiometric surface data collected during the June 2020 field activities the Citronelle potentiometric surface continues to indicate a south-southwesterly flow direction. A review of the soil/boring well log indicates that WP-1 is likely not screened within the Pascagoula Formation, rather it appears as if it also a well completed within the Citronelle Formation.

Both the 2019 PSA Update and the 2020 PSA Update evaluated Naphthalene iso-contours nearby, and down-gradient of, WC-40 (see **Figure 4**). The iso-contours are closely aligned with the actual sampling results obtained from WC-57 in June 2020 (i.e. double-digit concentrations). A concentration gradient calculation utilizing the WC-40 December 2018, WC-40 December 2019 and the WC-57 June 2020 naphthalene concentrations (also shown on **Figure 4**), indicates that a concentration equal to or below the GWPS for naphthalene (6.2 ug/L), is expected to be achieved within approximately 15 feet down-gradient of WC-57. This information provides further credence that the naphthalene plume is well defined on the Wiggins facility and near WC-57. The PSA analyses indicate that both the naphthalene and PCP plumes are attenuating. The SCI for PCP reveals that the trends in WC-29 and WC-30 should be monitored closely to assess the occurrence of short-term variability or the development of a possible new trend in these wells.

The results of the recent groundwater sampling event, the newly installed monitoring wells and 2020 PSA Update indicate that the naphthalene and pentachlorophenol plumes are stable and/or decreasing and have been delineated within the bounds of the Wiggins facility itself. We look forward to discussing the results of this Data Gap Investigation with EPA following your review.

Table 1. Monitoring Well Completion Data

Well	Coordinates ⁸		Well Installation		Elevation ¹		Screen Top		Screen Bottom		Screen Length
Number	East	North	By	Date	Ground	TOC ²	Depth	Elevation	Depth	Elevation	(feet)
MONITORING WELLS											
WC-05	892440.09	486293.02	HET ³	Sep-81	204.71	204.73	15.00	187.90	25.00	177.90	10.00
WC-07 ⁷	892491.57	485728.29	LAW ⁴	May-83	239.10	241.20	41.00	198.10	60.20	178.90	19.20
WC-08	892560.82	486080.80	LAW	May-83	223.52	224.86	28.20	195.50	47.00	176.70	18.80
WC-08A	892554.92	486076.02	JLGA	Aug-84	223.24	224.43	29.00	194.24	109.00	114.24	20.00
WC-09P	892660.64	486263.69	JLGA	Dec-85	205.76	207.50	83.00	124.50	93.00	114.50	10.00
WC-11	892535.70	486330.19	LAW	May-83	201.18	202.58	6.20	195.00	25.00	176.20	18.80
WC-13	891218.52	486107.59	LAW	Apr-83	239.39	241.17	41.00	198.50	60.20	179.30	19.20
WC-14	892330.47	485826.81	LAW	Aug-83	236.04	238.04	40.90	195.20	60.30	175.80	19.40
WC-19	891355.76	485804.03	JLGA ⁵	Jul-84	244.51	247.27	55.00	189.50	65.00	179.50	10.00
WC-21 ⁷	892351.28	485578.68	JLGA	Jun-87	240.80	243.30	49.20	191.70	69.30	171.60	20.10
WC-22	891876.60	485885.79	JLGA	Dec-85	243.13	244.68	48.90	194.40	63.90	179.40	15.00
WC-23	891886.89	485693.26	JLGA	Dec-85	246.33	248.10	48.70	197.70	63.70	182.70	15.00
WC-24	891988.82	485536.83	JLGA	Dec-85	246.57	248.91	50.00	197.00	65.00	182.00	15.00
WC-25	892224.04	485542.50	JLGA	Dec-85	242.85	245.75	49.70	193.10	64.70	178.10	15.00
WC-26	891377.37	485532.31	JLGA	Dec-85	245.90	247.80	48.90	197.00	63.90	182.00	15.00
WC-28	892523.73	485528.18	JLGA	Jun-87	236.23	238.22	50.90	185.60	70.90	165.60	20.00
WC-29	892450.77	485615.96	JLGA	Jun-87	240.95	241.59	46.30	192.70	66.30	172.70	20.00
WC-30	892399.26	485683.20	JLGA	Jun-87	242.02	243.27	42.80	198.10	62.80	178.10	20.00
WC-31	892085.94	485915.25	JLGA	Jun-87	236.08	237.70	35.70	200.70	55.80	180.60	20.10
WC-33	891353.23	485855.78	JLGA	Jun-87	244.60	247.03	41.10	203.40	61.10	183.40	20.00
WC-34	891239.29	485863.29	JLGA	Jun-87	242.70	243.83	49.60	191.70	69.60	171.70	20.00
WC-35	891183.41	485949.10	JLGA	Jun-87	241.44	242.69	50.20	189.00	70.20	169.00	20.00
WC-36	891380.16	486427.42	JLGA	Jun-87	232.50	234.38	40.00	194.38	60.00	174.38	20.00
WC-39	892441.54	485230.69	WCC ⁶	Sep-91	239.94	242.10	95.00	144.52	105.00	134.52	10.00
WC-40	891916.00	485210.40	WCC	Sep-91	248.42	250.71	95.00	153.42	105.00	143.42	10.00
WC-41	892230.54	484611.18	WCC	Feb-93	248.92	251.43	122.50	126.56	132.50	116.56	10.00
WC-42	892574.90	483999.50	WCC	Feb-93	249.04	252.21	117.00	132.36	127.00	122.36	10.00
WC-43	892235.75	485831.53	WCC	Feb-93	235.81	238.33	106.00	129.23	116.00	119.23	10.00
WC-44	891613.66	484593.86	Premier	Jun-05	240.18	240.03	44.00	196.13	64.00	176.30	20.00
WC-45	891901.46	485234.61	Premier	Oct-06	248.48	248.15	98.00	150.48	108.00	141.48	10.00
WC-46	891924.27	485191.41	Premier	Oct-06	248.30	247.93	65.00	183.30	75.00	173.30	10.00
WC-47	891928.02	485181.15	Premier	Oct-06	248.21	247.77	95.00	153.21	105.00	143.21	10.00

Table 1. Monitoring Well Completion Data

Well Number	Coordinates ⁶		Well Installation		Elevation ¹		Screen Top		Screen Bottom		Screen Length (feet)
	East	North	By	Date	Ground	TOC ²	Depth	Elevation	Depth	Elevation	
WC-48	892538.87	484869.94	Premier	Oct-06	241.32	240.79	55.00	186.32	65.00	176.32	10.00
WC-56	891758.32	484923.09	EarthCon	Jun-20	245.84	245.09	95.00	150.09	105.00	140.09	10.00
WC-57	891769.51	484909.07	EarthCon	Jun-20	245.82	245.11	132.00	113.11	142.00	103.11	10.00
PILOT STUDY WELLS											
WC-48i	892433.67	486188.63	EarthCon	Oct-11	214.84	217.84	15.00	202.84	50.00	187.84	15.00
WC-49s	892428.82	486190.91	EarthCon	Oct-11	214.41	217.71	15.00	202.71	30.00	187.71	15.00
WC-49i	892433.67	486188.63	EarthCon	Oct-11	214.84	217.84	35.00	182.84	50.00	167.84	15.00
WC-50i	892458.70	486156.64	EarthCon	Oct-11	218.40	221.41	10.00	211.41	50.00	171.41	10.00
WC-50s	892454.71	486161.68	EarthCon	Oct-11	217.60	221.10	20.00	201.10	35.00	186.10	15.00
WC-51i	892490.22	486128.34	EarthCon	Oct-11	220.79	223.64	45.00	178.64	55.00	168.64	10.00
WC-51s	892485.81	486132.99	EarthCon	Oct-11	219.17	222.97	25.00	197.97	40.00	182.97	15.00
WC-52i	892338.52	486063.92	EarthCon	Oct-11	221.41	224.76	55.00	169.76	65.00	159.76	10.00
WC-52s	892332.92	486066.83	EarthCon	Oct-11	221.43	224.93	30.00	194.93	40.00	184.93	10.00
WC-53i	892406.53	4865051.28	EarthCon	Oct-11	225.21	228.21	55.00	173.21	65.00	163.21	10.00
WC-53s	892403.78	486057.38	EarthCon	Oct-11	224.81	228.01	35.00	193.01	50.00	178.01	15.00
WC-54s	892197.81	485908.37	EarthCon	Oct-11	228.92	232.52	35.00	197.52	50.00	182.52	15.00
WC-55i	892361.63	485902.31	EarthCon	Oct-11	230.80	234.23	55.00	179.23	65.00	169.23	10.00
WC-55s	892354.82	485908.45	EarthCon	Oct-11	230.84	234.09	35.00	199.09	50.00	180.84	15.00
RECOVERY WELLS											
WCP-1	892489.05	486255.65	JLGA	Nov-88	205.47	208.35	15.50	189.70	40.50	164.70	25.00
WCP-2	892356.81	486076.48	JLGA	Nov-88	223.14	225.67	32.80	190.00	57.90	165.00	25.10
WCP-3	892236.87	485928.84	JLGA	Nov-88	229.59	231.85	45.70	183.30	70.70	158.30	25.00
WCP-4	892040.90	485841.92	JLGA	Nov-88	239.43	242.26	50.00	189.10	75.00	164.10	25.00
WCP-5	892464.48	485919.85	JLGA	Nov-88	230.57	233.36	35.00	195.30	60.00	170.30	25.00
WCP-6	892181.51	485784.28	JLGA	Nov-88	238.25	241.38	45.60	193.10	70.60	168.10	25.00
WCP-7	892043.36	486272.25	JLGA	Nov-88	240.65	244.21	52.00	188.70	77.00	163.70	25.00
WCP-8	892125.64	485602.41	JLGA	Nov-88	244.09	247.24	56.50	187.50	81.50	162.50	25.00
WCP-9	891307.75	485835.72	JLGA	Nov-88	243.32	245.62	57.00	186.40	82.00	161.40	25.00
PASCAGOULA WELLS											
WP-1 ⁹	892666.23	486260.10	LAW	May-83	205.79	207.52	135.00	N/A	144.40	N/A	9.40
WP-2	892135.70	485799.89	JLGA	Aug-84	238.60	239.39	169.00	N/A	189.00	N/A	20.00

Table 1. Monitoring Well Completion Data

Well Number	Coordinates ⁸		Well Installation		Elevation ¹		Screen Top		Screen Bottom		Screen Length (feet)
	East	North	By	Date	Ground	TOC ²	Depth	Elevation	Depth	Elevation	
WP-3	892848.43	484755.97	JLGA	Aug-84	239.54	242.59	159.00	N/A	169.00	N/A	10.00
WP-4P	892680.20	486161.95	JLGA	Dec-85	205.40	207.55	167.00	N/A	217.00	N/A	50.00
RECHARGE WELLS											
WCR-1 ⁷	892199.23	486349.48	JLGA	Nov-88	219.90	222.89	30.00	189.90	45.00	174.90	15.00
WCR-2 ⁷	892117.96	486306.24	JLGA	Nov-88	221.20	224.19	30.00	191.20	45.00	176.20	15.00
WCR-3 ⁷	892028.91	486263.01	JLGA	Nov-88	224.20	226.36	35.00	189.20	50.00	174.20	15.00
WCR-4 ⁷	891935.53	486219.77	JLGA	Nov-88	227.30	230.22	35.00	192.30	50.00	177.30	15.00
WCR-5 ⁷	892245.91	486368.50	JLGA	Apr-89	218.20	221.02	18.50	199.70	110.50	107.70	92.00
WCR-6 ⁷	892159.46	486328.72	JLGA	Apr-89	220.80	223.16	20.00	200.80	110.50	110.30	90.00
WCR-7 ⁷	892075.59	486294.13	JLGA	Apr-89	222.80	225.16	16.50	206.30	108.00	114.80	91.50
WCR-8 ⁷	891970.98	486235.34	JLGA	Apr-89	226.00	228.83	25.00	201.00	105.00	121.00	80.00

Notes:

- 1 All Depths and elevation are in feet, screen depth is measured below ground surface.
 - 2 **TOC** = Top of Casing
 - 3 **HET** = Harmon Engineering and Testing Company
 - 4 **LAW** = Law Engineering Testing Company
 - 5 **JLGA** = James L. Grant and Associates
 - 6 **WCC** = Woodward-Clyde Consultants
 - 7 Well was abandoned in June 2005.
 - 8 Wells were resurveyed in 2020. Coordinate system shown is Mississippi East State Plane (feet).
 - 9 A review of the soil/boring well log indicates that WP-1 is likely not screened within the Pascagoula Formation, rather it appears as if it also a well completed within the Citronelle Formation. The top of the Pascagoula formation (as described in other site well logs (i.e. WP-2) and encountered in the soil cores recovered during the drilling of WC-57 is a blue-gray stiff Clay. This material was not noted in the WP-1 well log.
- N/A Information not available.

Prepared by: JB 7/2/2020
Reviewed by: NDK 7/2/2020

Table 2. MDEQ Permit Monitoring Parameters/GWPS

Constituent	GWPS (ug/L)
GWPS	
2,3,4,6-Tetrachlorophenol	1100
2,4,6-Trichlorophenol	3.6
2,4-Dichlorophenol	110
2,4-Dimethylphenol	730
2-Methylnaphthalene	122
2-Methylphenol (o Cresol)	1800
Acenaphthene	370
Acenaphthylene	2190
Anthracene	1800
Benzo(b)fluoranthene	0.092
Benzo(k)fluoranthene	0.92
Carbazole	3.4
Chrysene	9.2
Dibenzofuran	12
Fluoranthene	1500
Phenol	11000
Pyrene	180
Ethylbenzene	700
Xylene	10000
Modified GWPS	
Fluorene	240
Naphthalene	6.2
Pentachlorophenol	1.0
Phenanthrene	1100
3 and 4-Methylphenol (m and p Cresol)*	180*

Prepared by: MAB 02/03/12

Checked by: AGL 02/06/12

Notes:

*3- and 4-methylphenol coelute and are reported as a combined result. The 4-methylphenol GWPS is used to compare to the combined results as it is the lower GWPS.

Table 3. Laboratory Analytical Results Summary – Permit Wells - June 2020

Analyte	Station		WC-08	WC-39	WC-41	WC-44	Equip. Blank	WC-11	DUP-1	WC-26
	Sample		WC-8	WC-39	WC-41	WC-44	EB-01	WC-11	WC-11	WC-26
	Date		06/15/20	06/15/20	06/15/20	06/15/20	06/15/20	06/15/20	06/15/20	06/16/20
	Units	GWPS								
3- & 4-Methylphenol	ug/L	180	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Fluorene	ug/L	240	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	ug/L	6.2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Phenanthrene	ug/L	1100	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Sum of the above creosote constituents			ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol (PCP)	ug/L	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.45

Notes:

J - Estimated concentration

U - Not detected at the method detection limit shown

ND - Not detected

NA - Not analyzed

DUP - Field duplicate sample

Shaded values exceed the GWPS

Prepared By: NDK

Checked By: CAC

6/23/2020

7/30/2020

Table 4. Laboratory Analytical Results Summary – Work Plan Wells - June 2020

Station			WP-1	WP-2	DUP-02	WC-8A	WC-43	WCP-8	WC-56	DUP-03	WC-57	DUP-4	Equip. Blank
Sample			WP-1	WP-2	WP-2	WC-8A	WC-43	WCP-8	WC-56	WC-56	WC-57	WC-57	EB-2
Date			06/17/20	06/17/20	06/17/20	06/17/20	06/17/20	06/17/20	06/18/20	06/18/20	06/18/20	06/18/20	06/17/20
Analyte	Units	GWPS											
Ethylbenzene	ug/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	10000	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Sum of the above VOC parameters													
Carbazole	ug/L	3.4	0.112 J	10.0 U	10.0 U	10.0 U	10.0 U	5.03 J	10.0 U	10.0 U	10.0 U	0.144 J	10.0 U
Dibenzofuran	ug/L	12	0.252 J	10.0 U	10.0 U	10.0 U	10.0 U	1.64 J	10.0 U	10.0 U	1.16 J	1.52 J	10.0 U
2,4-Dichlorophenol	ug/L	110	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2,4-Dimethylphenol	ug/L	730	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
3&4-Methylphenol	ug/L	180	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Phenol	ug/L	11000	4.870 J	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Pentachlorophenol	ug/L	1.0	1.82 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.82
2,4,6-Trichlorophenol	ug/L	3.6	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
2,3,4,6-Tetrachlorophenol	ug/L	1100	0.391 J	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Sum of the above SVOC parameters			7.445	ND	ND	0.889	ND	6.67	ND	ND	1.16		
Anthracene	ug/L	1800	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.0325 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Acenaphthene	ug/L	370	0.0354 J	0.05 U	0.05 U	0.05 U	0.05 U	0.509	0.05 U	0.05 U	1.99	1.65	0.05 U
Acenaphthylene	ug/L	2190	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.0256 J	0.0206 J	0.05 U
Benzo(b)fluoranthene	ug/L	0.092	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.0170 J	0.05 U
Benzo(k)fluoranthene	ug/L	0.92	0.0330 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.25 U	0.05 U	0.05 U	0.05 U	0.05 U
Chrysene	ug/L	9.2	0.05 UJ	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Fluoranthene	ug/L	1500	0.1 UJ	0.1 U	0.1 U	0.1 U	0.1 U	0.028 J	0.0213 J	0.0324 J	0.0340 J	0.0371 J	0.1 U
Fluorene	ug/L	240	0.0337 J	0.05 U	0.05 U	0.05 U	0.05 U	4.40	0.05 U	0.05 U	1.05	0.888	0.05 U
Naphthalene	ug/L	6.2	2.48 J	0.25 U	0.25 U	0.25 U	0.25 U	6.09	0.5 U	0.25 U	59.1	41.7	0.25 U
Phenanthrene	ug/L	1100	0.0286 J	0.05 U	0.05 U	0.0183 J	0.05 U	0.937	0.0814 J	0.05 U	0.566	0.400	0.05 U
Pyrene	ug/L	180	0.0209 J	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.0397 J	0.05 U
2-Methylnaphthalene	ug/L	122	0.1000 J	0.25 U	0.25 U	0.25 U	0.25 U	1.38	0.5 U	0.25 U	5.21 J	3.23 J	0.25 U
Sum of the above SVOC SIM parameters			2.7316	ND	ND	0.183	ND	13.38	0.1027	0.0324	67.9416	47.926	

Notes:

U - Not detected at the method detection limit / reporting limit shown or qualified based on data validation

J- Value is an estimate of concentration below the Reported Detection Limit (RDL) or qualified based on data validation

ND - Not detected

NA - Not Analyzed

FD - Field duplicate sample

Shaded values exceed the GWPS

Prepared By: NDK 6/29/2020

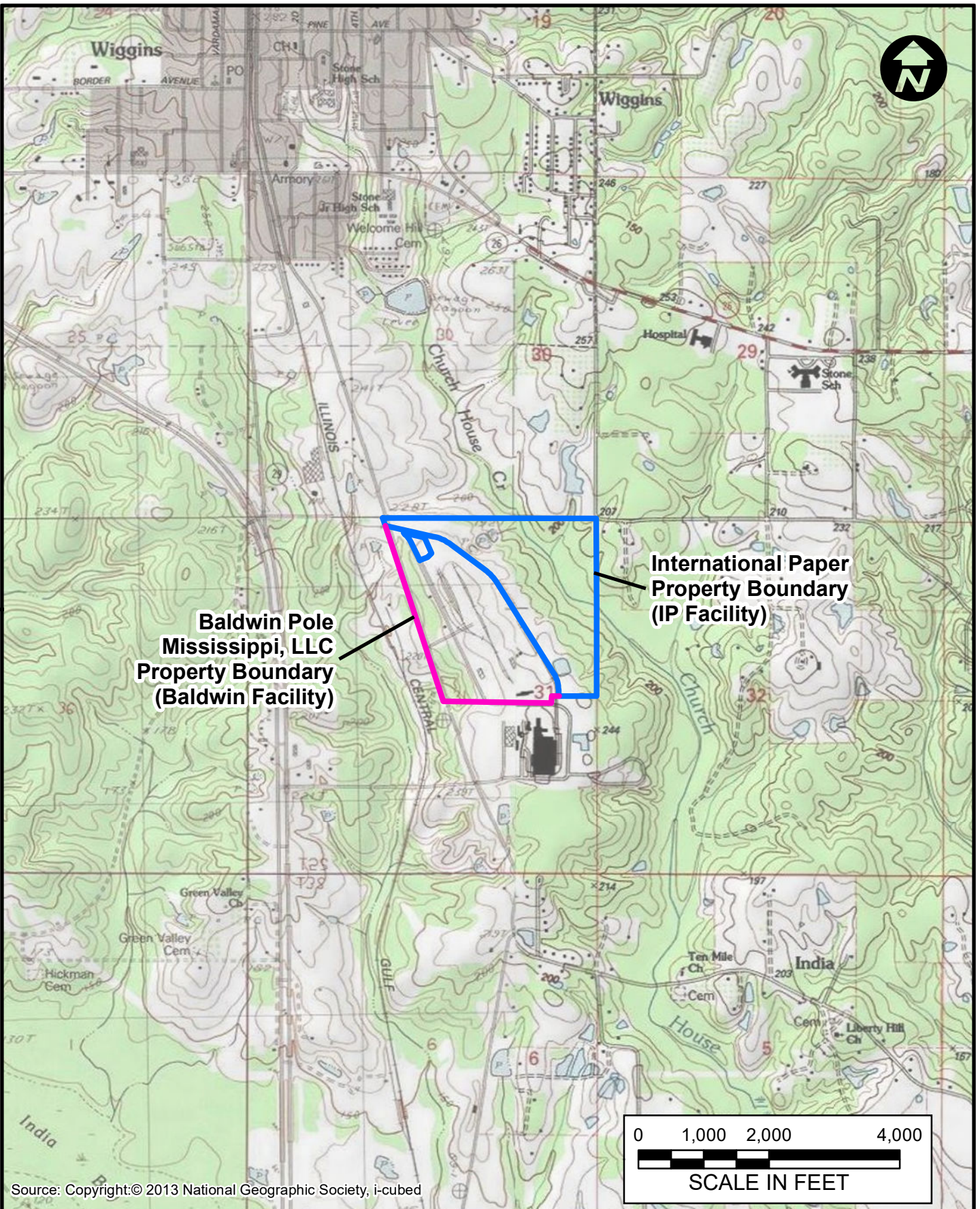
Checked By: CAC 7/30/2020

Table 5 Water Level Data - June 2020

Well Number	Top of Casing Elevation (feet)	Water Depth (feet)	Water Elevation (feet)
WC-8	224.86	32.20	192.66
WC-8A	224.43	32.26	192.17
WC-11	202.58	9.25	193.33
WC-26	247.80	59.40	188.40
WC-39	242.10	54.28	187.82
WC-41	251.43	65.18	186.25
WC-43	238.33	48.14	190.19
WC-44	240.03	53.90	186.13
WP-1	207.52	15.05	192.47
WP-2	239.39	51.14	188.25
WC-56	245.09	62.94	182.15
WC-57	245.11	64.89	180.22
WCP-8	247.24	57.71	189.53

Prepared By: NDK 7/2/2020
Checked By: HP 7/2/2020

File: S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\GIS\Fig-1 Site Location Map.mxd 8/6/2020 4:26:10 PM hpham



INTERNATIONAL PAPER

FORMER TREATED WOOD PRODUCTS FACILITY
WIGGINS, MISSISSIPPI

PROJECT NO. 02.20000006.90

EARTHCON

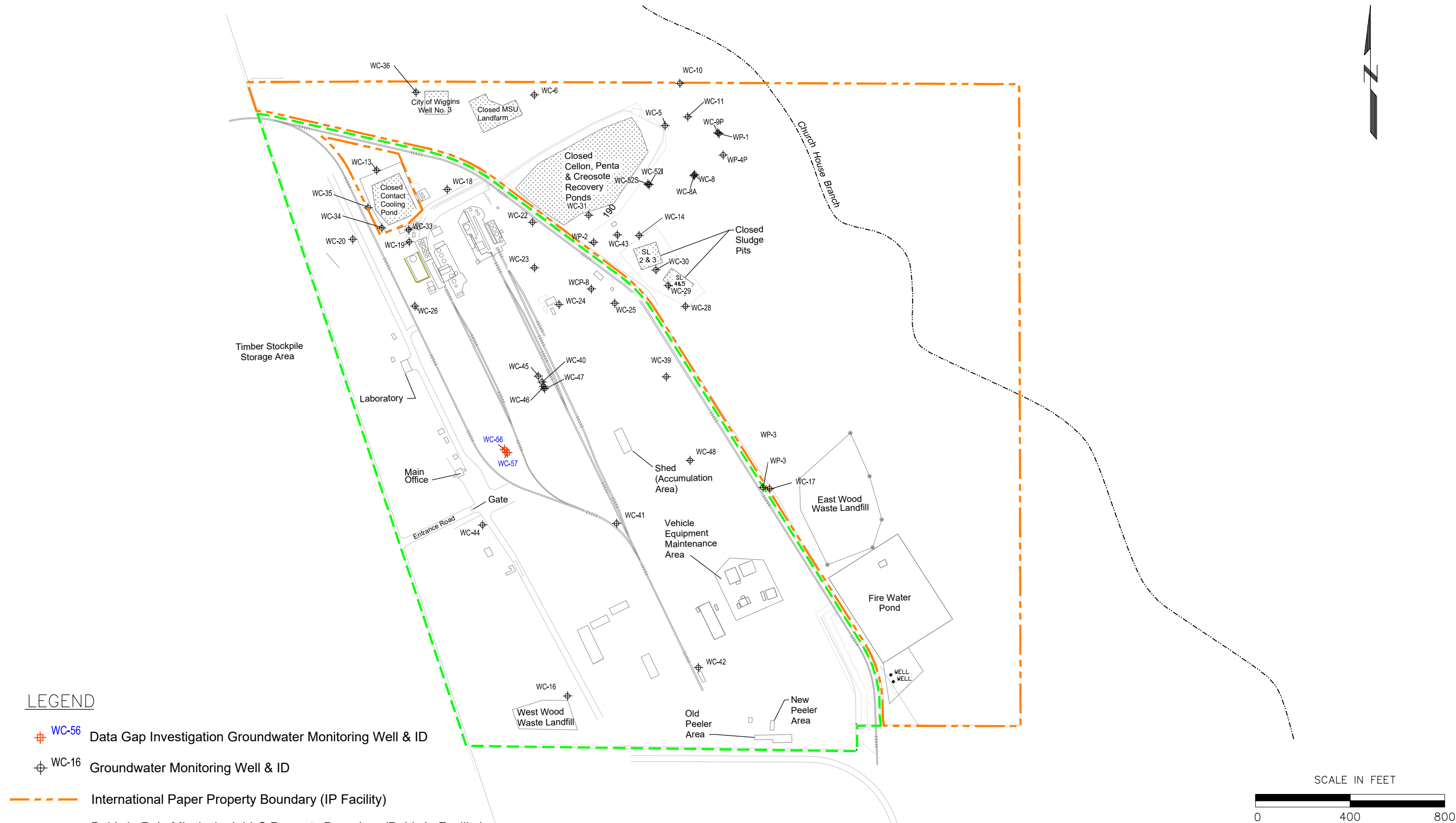
EarthCon Consultants, Inc.

1880 West Oak Pkwy, Building 100, Suite 106
Marietta, GA 30062
(770)973-2100

SITE LOCATION MAP

DRAWN HVP	CHECKED DA	DATE AUG 2020	FIGURE 1
--------------	---------------	------------------	-------------

FILENAME: Nov 2016 S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\Monitoring Reports\2019\Proposed Monitoring Well Locations.dwg (PRP_WELLS) 08/06/20 16:29 - hpham



LEGEND

- WC-56 Data Gap Investigation Groundwater Monitoring Well & ID
- WC-16 Groundwater Monitoring Well & ID
- International Paper Property Boundary (IP Facility)
- Baldwin Pole Mississippi, LLC Property Boundary (Baldwin Facility)
- Railroad tracks

(Aerial Source: Google Earth Imagery 03/2019)

INTERNATIONAL PAPER
FORMER TREATED WOOD PRODUCTS FACILITY
WIGGINS, MISSISSIPPI

PROJECT NO. 02.20000006.90

EARTHCON®

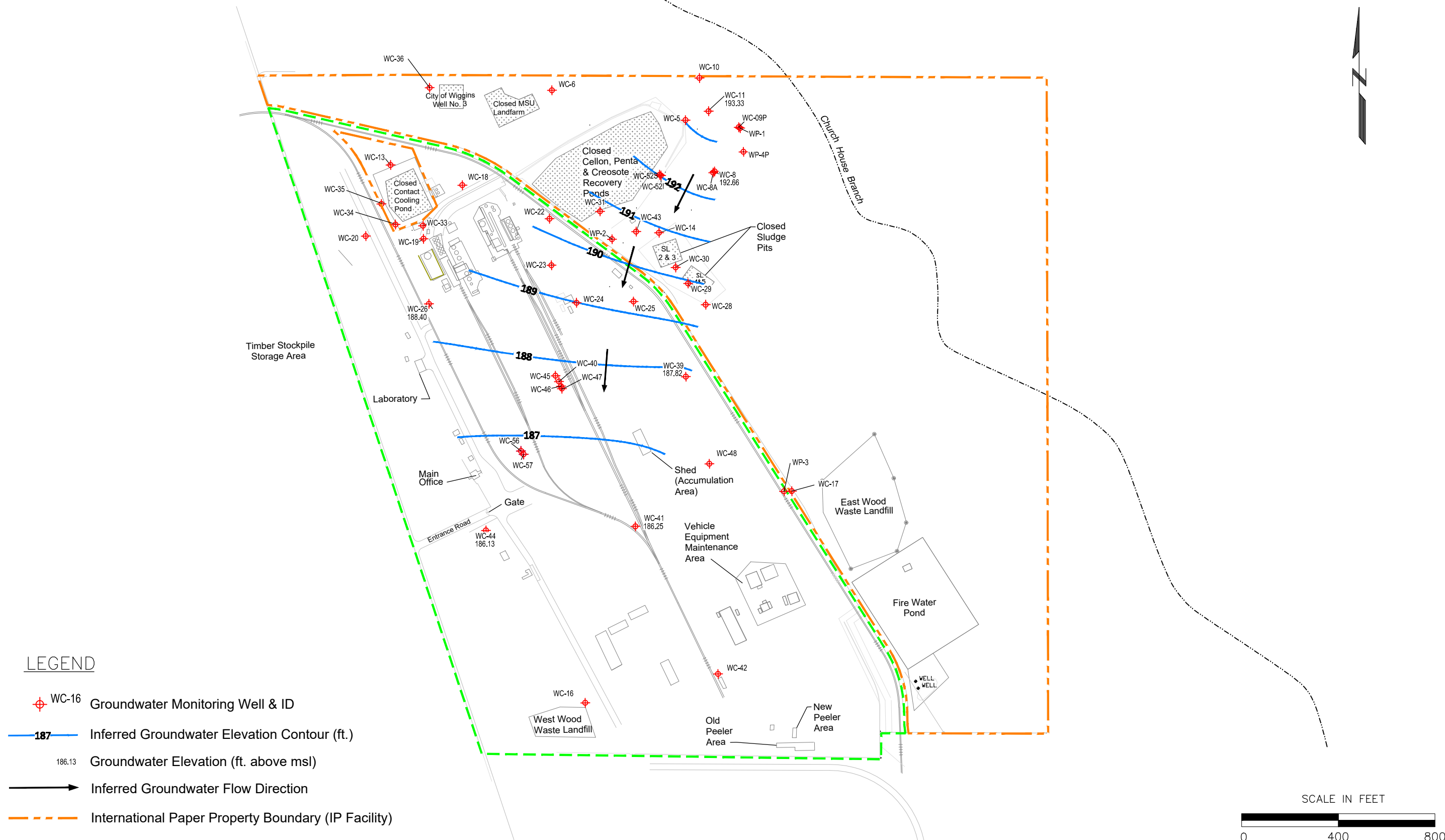
EarthCon Consultants, Inc.

1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

WIGGINS SITE MAP

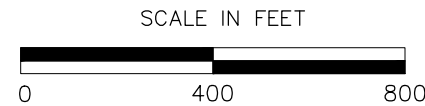
DRAWN: HVP	CHECKED: DCA	DATE: AUGUST 6, 2020	FIGURE: 2
------------	--------------	----------------------	-----------

FILENAME: Nov2016 S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\Monitoring Reports\2019\June 2020 POT.dwg (POT MAP FOR 6 MWs) 08/06/20 16:32 - hpham



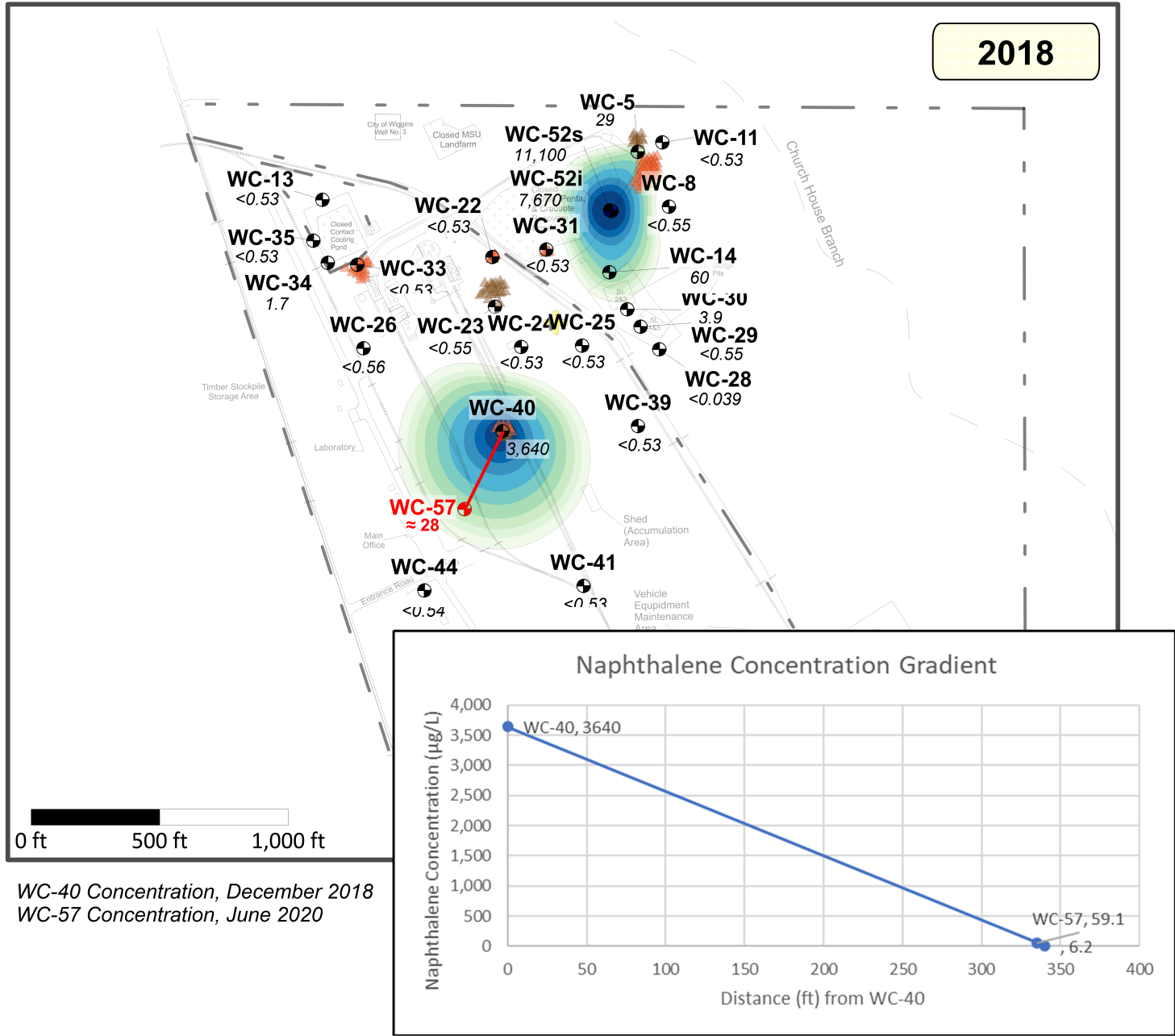
LEGEND

- WC-16 Groundwater Monitoring Well & ID
- 187 Inferred Groundwater Elevation Contour (ft.)
- 186.13 Groundwater Elevation (ft. above msl)
- Inferred Groundwater Flow Direction
- International Paper Property Boundary (IP Facility)
- Baldwin Pole Mississippi, LLC Property Boundary (Baldwin Facility)
- Railroad tracks
- *
- NM

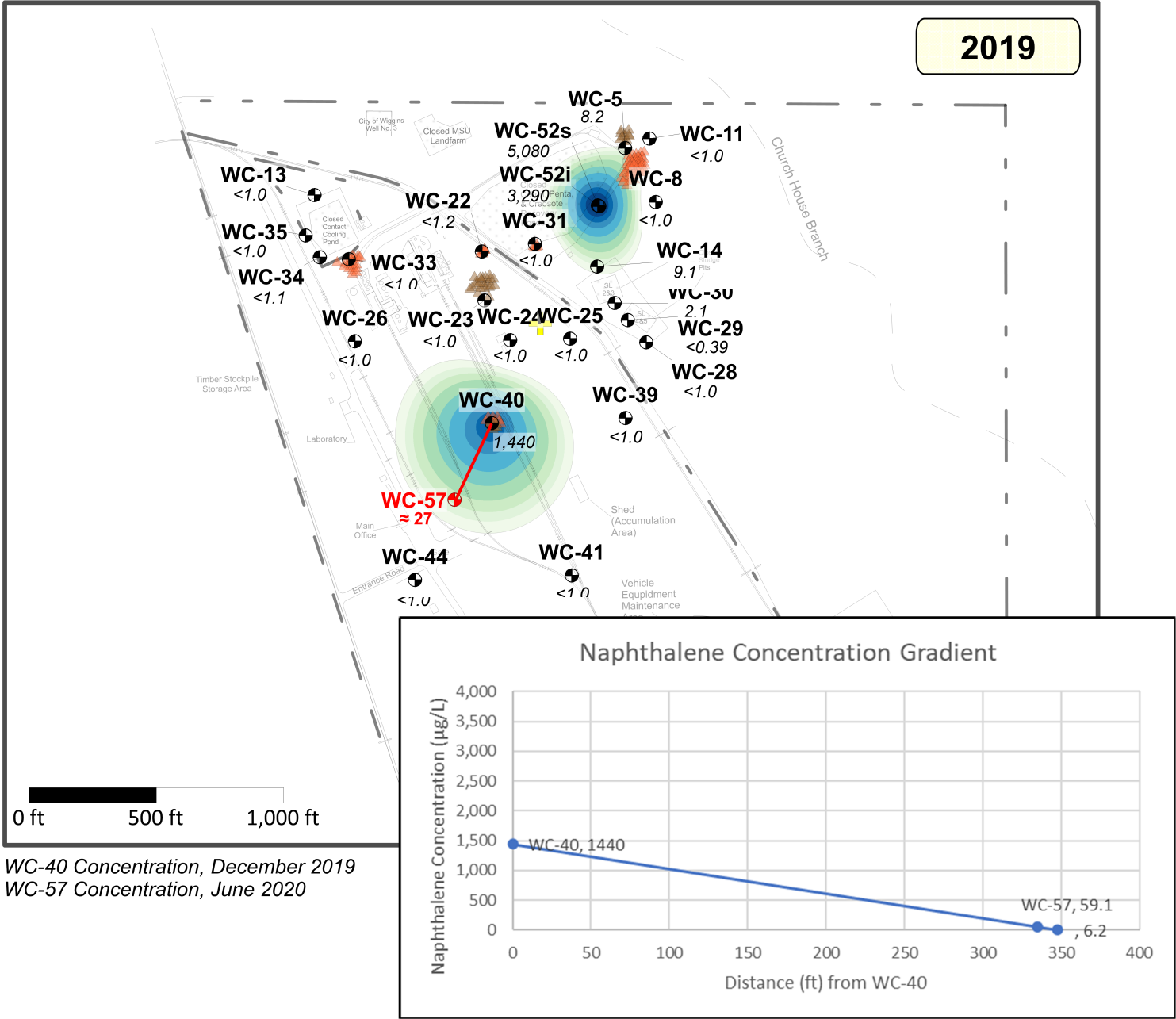


INTERNATIONAL PAPER FORMER TREATED WOOD PRODUCTS FACILITY WIGGINS, MISSISSIPPI PROJECT NO. 02.20000006.90	 EARTHCON EarthCon Consultants, Inc. 1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062	CITRONELLE AQUIFER POTENTIOMETRIC SURFACE MAP JUNE 23, 2020
DRAWN: HVP	CHECKED: DCA	DATE: 8/6/2020
FIGURE: 3		

2018

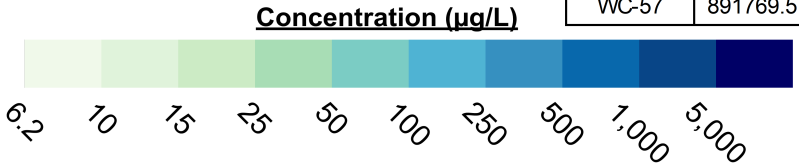


2019



Well	X	Y	Naphthalene (µg/L)	Δ Naphthalene (µg/L)	Distance (ft)	Naphthalene Gradient (µg/L/ft)	Distance (ft) from WC-57 to 6.2 µg/L
WC-40	891916.00	485210.40	3,640	3,580.9	335	-10.69	4.9
WC-57	891769.51	484909.07	59.1				

Well	X	Y	Naphthalene (µg/L)	Δ Naphthalene (µg/L)	Distance (ft)	Naphthalene Gradient (µg/L/ft)	Distance (ft) from WC-57 to 6.2 µg/L
WC-40	891916.00	485210.40	1,440	1,380.90	335	-4.12	12.8
WC-57	891769.51	484909.07	59.1				



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

27 Expected concentration (µg/L) of WC-57 based on contouring.

Emily W. Lee, P.G. (AR, IL, MS, TN)
Remediation Project Manager
Environment, Health, & Safety



6400 Poplar Avenue
Memphis, TN 38197

T 901 419 7725
M 901 304 4022
emily.lee@ipaper.com

January 29, 2020

Maher Budeir
RCRA Corrective Action Section
U.S. EPA – Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Subject: Data Gap Investigation Work Plan
International Paper Company
Wood Treating Site, EPA ID # MSD 980 600 084
Wiggins, Mississippi

Dear Mr. Budeir:

International Paper Company submits herein a Data Gap Investigation Work Plan (Work Plan) that includes the elements agreed to in a meeting with EPA, MDEQ, IP and EarthCon representatives during a site visit on December 10, 2019. IP is prepared to begin implementing the Work Plan upon receipt of your approval.

Please do not hesitate to call me at (901) 419-7725 if you need any additional information or have any questions or comments.

Sincerely,

A handwritten signature in blue ink that reads "Emily W. Lee".

Emily W. Lee, P.G.

Attachments:

cc: Noman Ahsanuzzaman, EPA Region 4
Steve Ginski, IP
Trudy D. Fisher, Butler Snow
Krista Caron, MDEQ
Robert Huckaby, MDEQ
Norman Kennel, EarthCon
Doug Seely, EarthCon

DATA GAP INVESTIGATION WORK PLAN

**INTERNATIONAL PAPER COMPANY
CLOSED FORMER WOOD TREATING SITE UNITS
WIGGINS, MS 39577
MSD 980 600 084**

PREPARED FOR:

**INTERNATIONAL PAPER COMPANY
6400 POPLAR AVENUE
MEMPHIS, TN 38197-0001**

PREPARED BY:

**EARTHCON CONSULTANTS, INC.
1880 WEST OAK PARKWAY
BUILDING 100, SUITE 106
MARIETTA, GA 30062**

PROJECT NO. 02.20000006

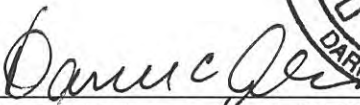
JANUARY 29, 2020

REGISTERED PROFESSIONAL GEOLOGIST STATEMENT

DATA GAP INVESTIGATION WORK PLAN
INTERNATIONAL PAPER
CLOSED FORMER WOOD TREATING SITE UNITS
WIGGINS, MS
HAZARDOUS WASTE MANAGEMENT FACILITY MSD 980 600 084

I have reviewed this document in sufficient depth to accept full responsibility for its contents related to the geologic discussion/data/information contained herein.




Darrell C. Adkins, RPG #0709
EarthCon Consultants, Inc.

January 29, 2020
Date

Table of Contents

1.0	INTRODUCTION	1
2.0	MONITORING WELL INSTALLATION AND ABANDONMENT	2
2.1	Utility Locating	2
2.2	Soil Borings	2
2.3	Monitoring Well Installation	3
2.3	Monitoring Well Abandonment	3
2.4	Surveying	3
3.0	MONITORING WELL REDEVELOPMENT	3
4.0	GROUND WATER SAMPLING	3
4.1	Laboratory Analyses	4
4.2	Quality Assurance and Quality Control	4
5.0	INVESTIGATIVE-DERIVED WASTE MANAGEMENT	4
6.0	REPORT PREPARATION	5

List of Tables

Table 1.	Monitoring Well Completion Data
Table 2.	Monitoring Parameters and GWPS

List of Figures

Figure 1.	Site Location Map
Figure 2.	Wiggins Facility Site Map
Figure 3.	Citronelle Aquifer Potentiometric Surface Map December 9, 2019
Figure 4.	Pascagoula Aquifer Potentiometric Surface Map December 9, 2019
Figure 5.	Proposed Well Locations Map

List of Appendices

Appendix A	Soil Boring and Well Construction Logs for Select Wells
Appendix B	Photographs
Appendix C	Fieldwork Documentation Forms

1.0 INTRODUCTION

International Paper Company (IP) is conducting corrective action and groundwater monitoring at the Closed Former Wood Treating Site Units in Wiggins, Mississippi (Wiggins facility) according to the State of Mississippi Hazardous Waste Management Permit HW-980-600-084 that was issued on May 4, 2010 and the HSWA portion of the permit that became effective January 4, 1993.

In a meeting held on December 10, 2019, attended by US Environmental Protection Agency (EPA), Mississippi Department of Environmental Quality (MDEQ), IP and EarthCon Consultants, Inc. (EarthCon) personnel, it was agreed the IP would prepare a Data Gap Investigation Work Plan (Work Plan) for EPA review to include the elements summarized in the following meeting summary:

- *Installation of a “well cluster” in the area between wells WC-40 and WC-44 (actual location to be based upon a review of the potentiometric surface data collected on December 9, 2019)*
 - *One well is to be screened similarly to WC-40 (~135-145’ msl).*
 - *The second, deeper well will be screened at the bottom of the Citronelle/top of Pascagoula formations (~115-125’ msl).*
 - *The wells will be purged and sampled per methods used for other routine site well sampling.*
- *The following wells will be redeveloped, purged, and sampled:*
 - *WC-43*
 - *WC-08A*
 - *WCP-8*
 - *WP-01*
 - *WP-02*
- *Wells with greater than 10’ of well screen (i.e. WC-08A, WCP-8 and WP-02) will utilize a “packer” to isolate the bottom 10’ of the screen length during sampling.*

The discussion during the meeting included EPA’s concern that elevated concentrations of dissolved wood treating chemical constituents or dense non-aqueous phase liquids (DNAPL) may exist hydraulically downgradient from the closed units at the bottom of the Citronelle/top of the Pascagoula formations. The top of the Pascagoula formation is an aquitard, consisting of clay; therefore, DNAPL, if present may collect in this zone.

EPA, MDEQ, IP and EarthCon representatives also conducted a site visit on December 10, 2019. During the site visit, three shallow wells were observed inside the closed treatment impoundment area (see attached example photograph in Appendix B). The wells were examined during the site visit and were found to be approximately 40 feet deep. IP searched available records regarding well installation/construction, functionality and/or intended use of the wells and was unable to locate any information regarding these three wells.

Included in this Work Plan are a site location map (**Figure 1**), a site map showing features at the Wiggins facility and existing monitoring well locations (**Figure 2**), and potentiometric surface maps for the Citronelle and Pascagoula formation wells based on data collected in December 2019

(**Figures 3 and 4**). A summary of monitoring well construction data is also attached for reference (**Table 1**). Drilling and well construction logs for WC-08A, WC-40, WC-43, WC-44, WCP-8, WP-1 and WP-2 are included in **Appendix A**.

2.0 MONITORING WELL INSTALLATION AND ABANDONMENT

A monitoring well cluster, consisting of two wells designated WC-56 and WC-57 will be installed in an area between monitoring wells WC-40 and WC-44 as shown on **Figure 5**. The location of the well cluster is hydraulically downgradient of WC-40 based on December 2019 potentiometric surface data (**Figure 3**). The purpose of the two new monitoring wells is to assess potential concentrations of creosote constituents and pentachlorophenol (PCP) in the Citronelle aquifer downgradient from monitoring well WC-40:

- At a similar screen depth as WC-40; and
- At a greater depth; i.e. the at the bottom of the Citronelle/top of Pascagoula formation.

During the same mobilization to install the monitoring well cluster, the three existing monitoring wells identified inside the closed treatment impoundment area will be abandoned.

Monitoring well installation and abandonment will be conducted by a Mississippi-licensed Water Well Contractor and in accordance with applicable guidance included in EPA Region 4 SEDGUID-1-1-R0, Design and Installation of Monitoring Wells (https://www.epa.gov/sites/production/files/2014-03/documents/appendix_m_monitor_well_installation.pdf) and MDEQ Administrative Procedures Act Rules Title 11, Part 7, Surface Water and Groundwater Use and Protection, Licensing of Water Well Contractors and Dam Safety Regulations (<https://www.mdeq.ms.gov/wp-content/uploads/2017/10/WellDrillerRegs..pdf>).

2.1 Utility Locating

Prior to drilling the boreholes for WC-56 and WC-57, Mississippi 811 will be contacted to identify the locations of public underground utilities in the vicinity of the work. In addition, facility utility information will be requested from Baldwin Pole Mississippi, and a private utility locating service will be contacted to identify potential conflicts with private underground utilities at the proposed boring locations.

2.2 Soil Borings

The boreholes will be drilled using the rotary sonic drilling method. The drilling will involve advancing 10-foot long sections of 4.5-inch outer diameter (OD) and 6.5-inch OD sonic rods. The 4.5-inch OD rod will be advanced 10 feet, then the 6.5-inch OD rod will be advanced over the smaller rod to the same depth. The 4.5-inch rod will then be retrieved to collect the soil sample. This process will be repeated at 10-foot intervals until the desired depth is reached.

The initial borehole, designated WC-56 will be advanced to the contact of the Citronelle and Pascagoula formations (the top of the latter formation is referred to as the Pascagoula clay), this contact has been identified at the Wiggins site as being a yellow to bluish-gray stiff silty clay. The

second borehole, designated WC-57 will be placed within approximately ten feet from WC-56 and to a depth of approximately 20 feet above the top of the Pascagoula clay. Soil samples will be retrieved from each borehole at 10-foot intervals and the samples will be placed in a polyethylene sleeve. The samples will be observed, classified and logged by the on-site geologist. The larger-diameter sonic rods remain in the borehole and act as an outer casing until the monitoring well is constructed.

2.3 Monitoring Well Installation

After reaching the terminal depth of each borehole, a groundwater monitoring well will be constructed in each borehole as the larger-diameter sonic rods are retrieved. The monitoring wells will be constructed of rigid poly-vinyl chloride (PVC), each with a 10-foot section of screen with 0.010-inch slots. A 20-40 sand filter pack will be installed around the screened section to approximately two feet above the top of the screen, followed by approximately two feet of bentonite pellets. The remainder of the annular space surrounding the riser will be filled with grout after the bentonite is hydrated. Each well will be completed at the surface with a load-rated locking monitoring well vault. After a minimum of 24 hours following well installation and surface completion, each well will be developed to remove residual materials remaining in the wells and to attempt to re-establish the natural hydraulic flow conditions of the formation around the wells. Well development methods used will include pumping with a submersible pump and/or an air-lift pump. The wells will be developed until the column of water in the well is reasonably free of visible sediment.

2.3 Monitoring Well Abandonment

The three monitoring wells observed inside the closed treatment impoundment area will be abandoned in a manner consistent with EPA and MDEQ guidance.

2.4 Surveying

The location and casing elevation for each newly installed well will be surveyed by a Mississippi-registered surveyor, and the information will be added to the site's well network database.

3.0 MONITORING WELL REDEVELOPMENT

Monitoring wells WC-43, WC-08A, WCP-8, WP-1, and WP-2 will be redeveloped prior to sampling. Prior to redevelopment, the depth of each well will be measured and compared to the constructed depth to identify the effort and methods needed for redevelopment. The wells will be redeveloped using a submersible and/or air-lift pump until sediment accumulated in the bottom of each well, if any, has been removed and the recovered water is reasonably free of sediment.

4.0 GROUND WATER SAMPLING

Groundwater samples will be collected during the Spring 2020 semi-annual monitoring event. Prior to sampling, an oil/water interface probe will be used to measure the depth to water, the

potential presence of separate-phase product, and the total depth of each well. Samples will be collected from:

- The permit required site wells,
- The newly installed monitoring wells (WC-56 and WC-57), and
- Wells WC-43, WC-08A, WCP-8, WP01, and WP-2.

Each well will be purged and sampled using the low-flow method described in the EPA Region 4, Science and Ecosystem Support Division, Operating Procedure SESDPROC-301-R4, Groundwater Sampling (<https://www.epa.gov/sites/production/files/2015-06/documents/Groundwater-Sampling.pdf>). Field parameter data including pH, specific conductance, temperature, dissolved oxygen, turbidity, and oxidation-reduction potential will be measured during purging and samples will be collected after measurements have stabilized. The data collected during sampling will be recorded Groundwater Sampling Record. A blank Groundwater Sampling Record form is included in **Appendix C**.

A packer will be installed in monitoring wells with screen lengths greater than 10 feet (i.e. WC-08A, WCP-8 and WP-2) prior to purging/sampling activities in an attempt to isolate the bottom of the screened interval during sampling. An inflatable packer will be installed and inflated approximately 10 feet above the bottom of the screened interval. The depth to water in the casing above the packer will be measured during purging and sampling and the purge/sampling rate will be adjusted to minimize drawdown.

4.1 Laboratory Analyses

The samples will be submitted to Pace analytical laboratory in Mt. Juliet, Tennessee for analyses for the Ground Water Protection Standards (GWPS) constituents listed in the MDEQ permit (**Table 2**) using EPA Methods 8260B and 8270C. The laboratory results will be reviewed and validated, and the validated results will be compared to the GWPS.

4.2 Quality Assurance and Quality Control

Quality control (QC) samples will consist of one equipment blank, one duplicate sample, a trip blank for each cooler (VOCs only), and a matrix spike/matrix spike duplicate.

5.0 INVESTIGATIVE-DERIVED WASTE MANAGEMENT

Investigative Derived Waste (IDW) generated during field activities will be addressed in accordance with USEPA Operating Procedure SESDPROC-202-R3 “Management of Investigative Derived Waste” (<https://www.epa.gov/sites/production/files/2015-06/documents/Management-of-IDW.pdf>). IDW (i.e. drill cuttings, development/purge water, etc.) will be containerized, and the ultimate disposition of the IDW will be determined once analytical results are received utilizing USEPA Operating Procedure SESDPROC-202-R3.

6.0 REPORT PREPARATION

Upon completion of the fieldwork, receipt of laboratory analyses and data validation, a report will be prepared that will include the following:

- A narrative summary of fieldwork and findings;
- Soil boring logs and well completion diagrams for each newly installed well;
- Well abandonment documentation;
- Groundwater sampling forms;
- Summary tables of field and laboratory data, including water levels and NAPL measurements;
- A site figure showing the locations of monitoring wells, including the newly installed wells; and,
- Laboratory analytical and data validation reports.

TABLES

Table 1. Monitoring Well Completion Data

Well Number	Coordinates ⁸		Well Installation		Elevation ¹		Screen Top		Screen Bottom		Screen Length (feet)
	East	North	By	Date	Ground	TOC ²	Depth	Elevation	Depth	Elevation	
MONITORING WELLS											
WC-05	51798.58	9782.7	HET ³	Sep-81	204.71	204.73	15	187.9	25	177.9	10
WC-07 ⁷	51871	9216	LAW ⁴	May-83	239.1	241.2	41	198.1	60.2	178.9	19.2
WC-08	51919.91	9570.82	LAW	May-83	223.52	224.86	28.2	195.5	47	176.7	18.8
WC-11	51894.09	9820.14	LAW	May-83	201.18	202.58	6.2	195	25	176.2	18.8
WC-13	50577.54	9593.83	LAW	Apr-83	239.39	241.17	41	198.5	60.2	179.3	19.2
WC-14	51690.28	9316.19	LAW	Aug-83	236.04	238.04	40.9	195.2	60.3	175.8	19.4
WC-19	50715.63	9290.66	JLGA ⁵	Jul-84	244.51	247.27	55	189.5	65	179.5	10
WC-21 ⁷	51734	9044	JLGA	Jun-87	240.8	243.3	49.2	191.7	69.3	171.6	20.1
WC-22	51236.24	9373.88	JLGA	Dec-85	243.13	244.68	48.9	194.4	63.9	179.4	15
WC-23	51247.08	9181.39	JLGA	Dec-85	246.33	248.1	48.7	197.7	63.7	182.7	15
WC-24	51349.14	9025.66	JLGA	Dec-85	247.08	249.64	50	197	65	182	15
WC-25	51584.65	9031.57	JLGA	Dec-85	242.85	245.75	49.7	193.1	64.7	178.1	15
WC-28	51884.38	9018.1	JLGA	Jun-87	236.23	238.22	50.9	185.6	70.9	165.6	20
WC-29	51811.17	9105.67	JLGA	Jun-87	240.95	241.59	46.3	192.7	66.3	172.7	20
WC-30	51759.47	9172.77	JLGA	Jun-87	242.02	243.27	42.8	198.1	62.8	178.1	20
WC-31	51445.5	9403.94	JLGA	Jun-87	236.08	237.7	35.7	200.7	55.8	180.6	20.1
WC-33	50712.96	9342.4	JLGA	Jun-87	244.6	247.03	41.1	203.4	61.1	183.4	20
WC-34	50599	9349.59	JLGA	Jun-87	242.7	243.83	49.6	191.7	69.6	171.7	20
WC-35	50542.87	9435.24	JLGA	Jun-87	241.44	242.69	50.2	189	70.2	169	20
WC-36	9924	50746	JLGA	Jun-87	232.5	234.38	40	194.38	60	174.38	20
WC-39	51803.03	8720.38	WCC ⁶	Sep-91	239.94	242.1	95	144.52	105	134.52	10
WC-40	51277.55	8698.61	WCC	Sep-91	248.42	250.71	95	153.42	105	143.42	10
WC-41	51593.77	8100.28	WCC	Feb-93	248.92	251.43	122.5	126.56	132.5	116.56	10
WC-42	51939.85	7489.57	WCC	Feb-93	249.04	252.21	117	132.36	127	122.36	10
WC-43	51595.42	9320.68	WCC	Feb-93	235.81	238.33	106	129.23	116	119.23	10
WC-44	50976.95	8081.22	Premier	Jun-05	240.18	240.03	44	196.13	64	176.3	20
WC-45	51262.94	8722.78	Premier	Oct-06	248.48	248.15	98	150.48	108	141.48	10
WC-46	51285.86	8679.64	Premier	Oct-06	248.30	247.93	65	183.3	75	173.3	10
WC-47	51289.65	8669.40	Premier	Oct-06	248.21	247.77	95	153.21	105	143.21	10
WC-48	51906.05	8265.80	Premier	Oct-06	241.32	240.79	55	186.32	65	176.32	10
PILOT STIDY WELLS											
WC-48i	486188.63	892433.67	EarthCon	Oct-11	214.84	217.84	15	202.84	50	187.84	15
WC-49s	486190.91	892428.82	EarthCon	Oct-11	214.41	217.71	15	202.71	30	187.71	15

Table 1. Monitoring Well Completion Data

Well Number	Coordinates ⁸		Well Installation		Elevation ¹		Screen Top		Screen Bottom		Screen Length (feet)
	East	North	By	Date	Ground	TOC ²	Depth	Elevation	Depth	Elevation	
WC-49i	486188.63	892433.67	EarthCon	Oct-11	214.84	217.84	35	182.84	50	167.84	15
WC-50i	486156.64	892458.70	EarthCon	Oct-11	218.4	221.41	10	211.41	50	171.41	10
WC-50s	486161.68	892454.71	EarthCon	Oct-11	217.6	221.10	20	201.1	35	186.1	15
WC-51i	486128.34	892490.22	EarthCon	Oct-11	220.79	223.64	45	178.64	55	168.64	10
WC-51s	486132.99	892485.81	EarthCon	Oct-11	219.17	222.97	25	197.97	40	182.97	15
WC-52i	486063.92	892338.52	EarthCon	Oct-11	221.41	224.76	55	169.76	65	159.76	10
WC-52s	486066.83	892332.92	EarthCon	Oct-11	221.43	224.93	30	194.93	40	184.93	10
WC-53i	4865051.28	892406.53	EarthCon	Oct-11	225.21	228.21	55	173.21	65	163.21	10
WC-53s	486057.38	892403.78	EarthCon	Oct-11	224.81	228.01	35	193.01	50	178.01	15
WC-54s	485908.37	892197.81	EarthCon	Oct-11	228.92	232.52	35	197.52	50	182.52	15
WC-55i	485902.31	892361.63	EarthCon	Oct-11	230.8	234.23	55	179.23	65	169.23	10
WC-55s	485908.45	892354.82	EarthCon	Oct-11	230.84	234.09	35	199.09	50	180.84	15
RECOVERY WELLS											
WCP-1	51852.92	9753.23	JLGA	Nov-88	205.47	208.35	15.5	189.7	40.5	164.7	25
WCP-2	51721.74	9566.54	JLGA	Nov-88	223.14	225.67	32.8	190	57.9	165	25.1
WCP-3	51602.79	9410.99	JLGA	Nov-88	229.59	231.85	45.7	183.3	70.7	158.3	25
WCP-4	51388.16	9340.05	JLGA	Nov-88	239.43	242.26	50	189.1	75	164.1	25
WCP-5	51786.76	9403.72	JLGA	Nov-88	230.57	233.36	35	195.3	60	170.3	25
WCP-6	51551.46	9267.35	JLGA	Nov-88	238.25	241.38	45.6	193.1	70.6	168.1	25
WCP-7	51748.16	9105.31	JLGA	Nov-88	240.65	244.21	52	188.7	77	163.7	25
WCP-8	51485.87	9091.15	JLGA	Nov-88	244.09	247.24	56.5	187.5	81.5	162.5	25
WCP-9	50669.18	9325.18	JLGA	Nov-88	243.32	245.62	57	186.4	82	161.4	25
PASCAGOULA WELLS											
WP-1	N/A	N/A	LAW	May-83	205.79	207.52	135	N/A	144.4	N/A	9.4
WP-2	N/A	N/A	JLGA	Aug-84	238.6	239.39	169	N/A	189	N/A	20
WP-3	N/A	N/A	JLGA	Aug-84	239.54	242.59	159	N/A	169	N/A	10
WP-4P	N/A	N/A	JLGA	Dec-85	205.4	207.55	167	N/A	217	N/A	50
RECHARGE WELLS											
WCR-1 ⁷	51561	9844	JLGA	Nov-88	219.9	222.89	30	189.9	45	174.9	15
WCR-2 ⁷	51475	9795	JLGA	Nov-88	221.2	224.19	30	191.2	45	176.2	15
WCR-3 ⁷	51386	9751	JLGA	Nov-88	224.2	226.36	35	189.2	50	174.2	15
WCR-4 ⁷	51292	9705	JLGA	Nov-88	227.3	230.22	35	192.3	50	177.3	15
WCR-5 ⁷	51603	9864	JLGA	Apr-89	218.2	221.02	18.5	199.7	110.5	107.7	92
WCR-6 ⁷	51518	9821	JLGA	Apr-89	220.8	223.16	20	200.8	110.5	110.3	90
WCR-7 ⁷	51443	9785	JLGA	Apr-89	222.8	225.16	16.5	206.3	108	114.8	91.5

Table 1. Monitoring Well Completion Data

Well Number	Coordinates ⁸		Well Installation		Elevation ¹		Screen Top		Screen Bottom		Screen Length (feet)
	East	North	By	Date	Ground	TOC ²	Depth	Elevation	Depth	Elevation	
WCR-8 ⁷	51327	9719	JLGA	Apr-89	226	228.83	25	201	105	121	80

Notes:

- 1 All depths and elevations are in feet, screen depth is measured below ground surface.
- 2 **TOC** = Top of Casing
- 3 **HET** = Harmon Engineering and Testing Company
- 4 **LAW** = Law Engineering Testing Company
- 5 **JLGA** = James L. Grant and Associates
- 6 **WCC** = Woodward-Clyde Consultants
- 7 Well was abandoned in June 2005.
- 8 Wells were resurveyed in 2006.
- N/A Information not available.

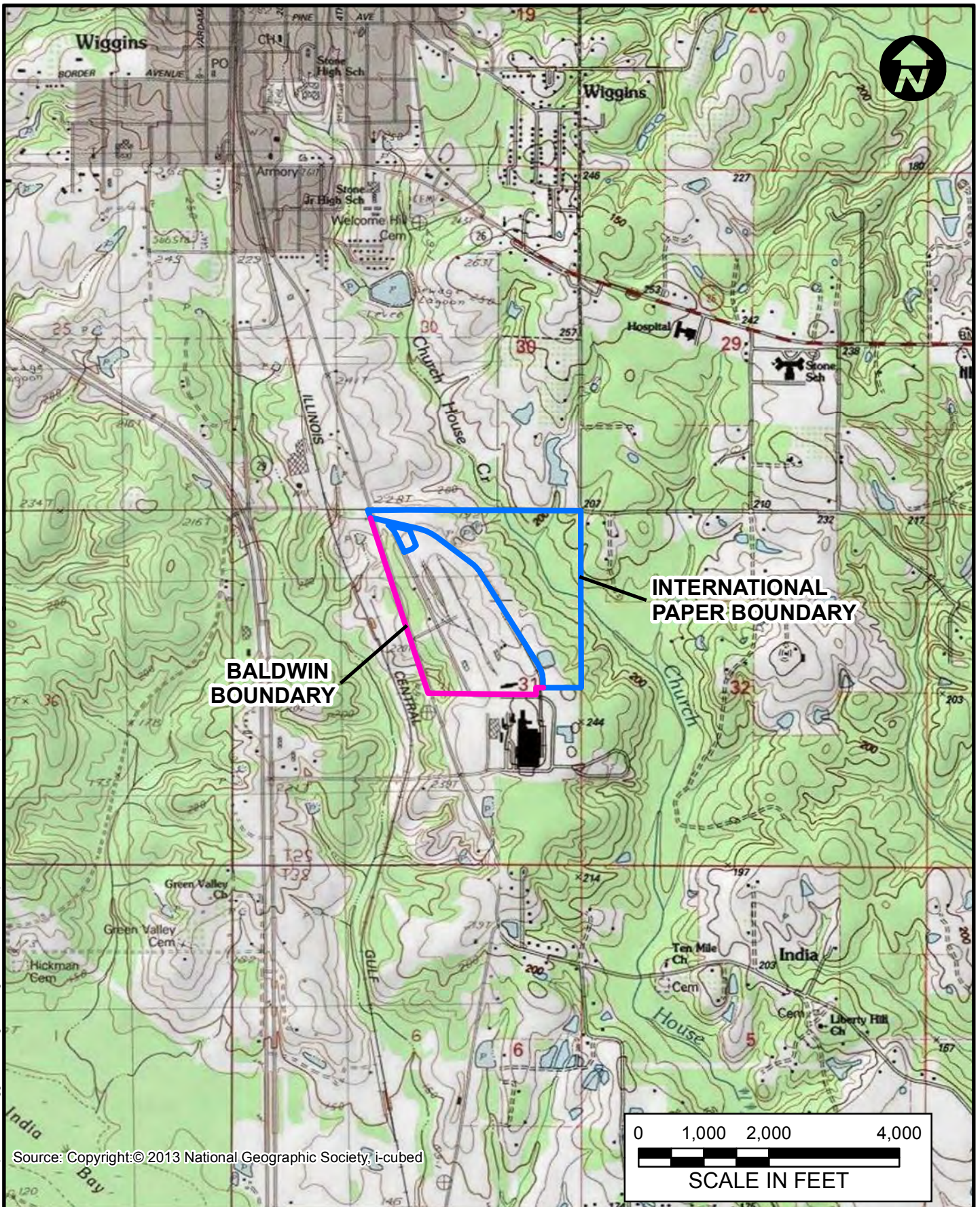
Prepared by: TJM 2/25/19
Reviewed by: JRM 2/28/19

Table 2. Monitoring Parameters and GWPS

Constituent	GWPS (ug/L)
2,3,4,6-Tetrachlorophenol	1100
2,4,6-Trichlorophenol	3.6
2,4-Dichlorophenol	110
2,4-Dimethylphenol	730
2-Methylnaphthalene	122
2-Methylphenol (o Cresol)	1800
3 and 4-Methylphenol (m and p Cresol)*	180**
Acenaphthene	370
Acenaphthylene	2190
Anthracene	1800
Benzo(b)fluoranthene	0.092
Benzo(k)fluoranthene	0.92
Carbazole	3.4
Chrysene	9.2
Dibenzofuran	12
Fluoranthene	1500
Fluorene*	240
Naphthalene*	6.2
Pentachlorophenol*	1.0
Phenanthrene*	1100
Phenol	11000
Pyrene	180
Ethylbenzene	700
Xylene	10000

FIGURES

File: S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\GIS\Fig-1 Site Location Map.mxd 3/11/2019 4:53:38 PM hpham



INTERNATIONAL PAPER

FORMER TREATED WOOD PRODUCT FACILITY
WIGGINS, MISSISSIPPI

PROJECT NO. 02.20000006

EARTHCON

EarthCon Consultants, Inc.

1880 West Oak Pkwy, Building 100, Suite 106
Marietta, GA 30062
(770)973-2100

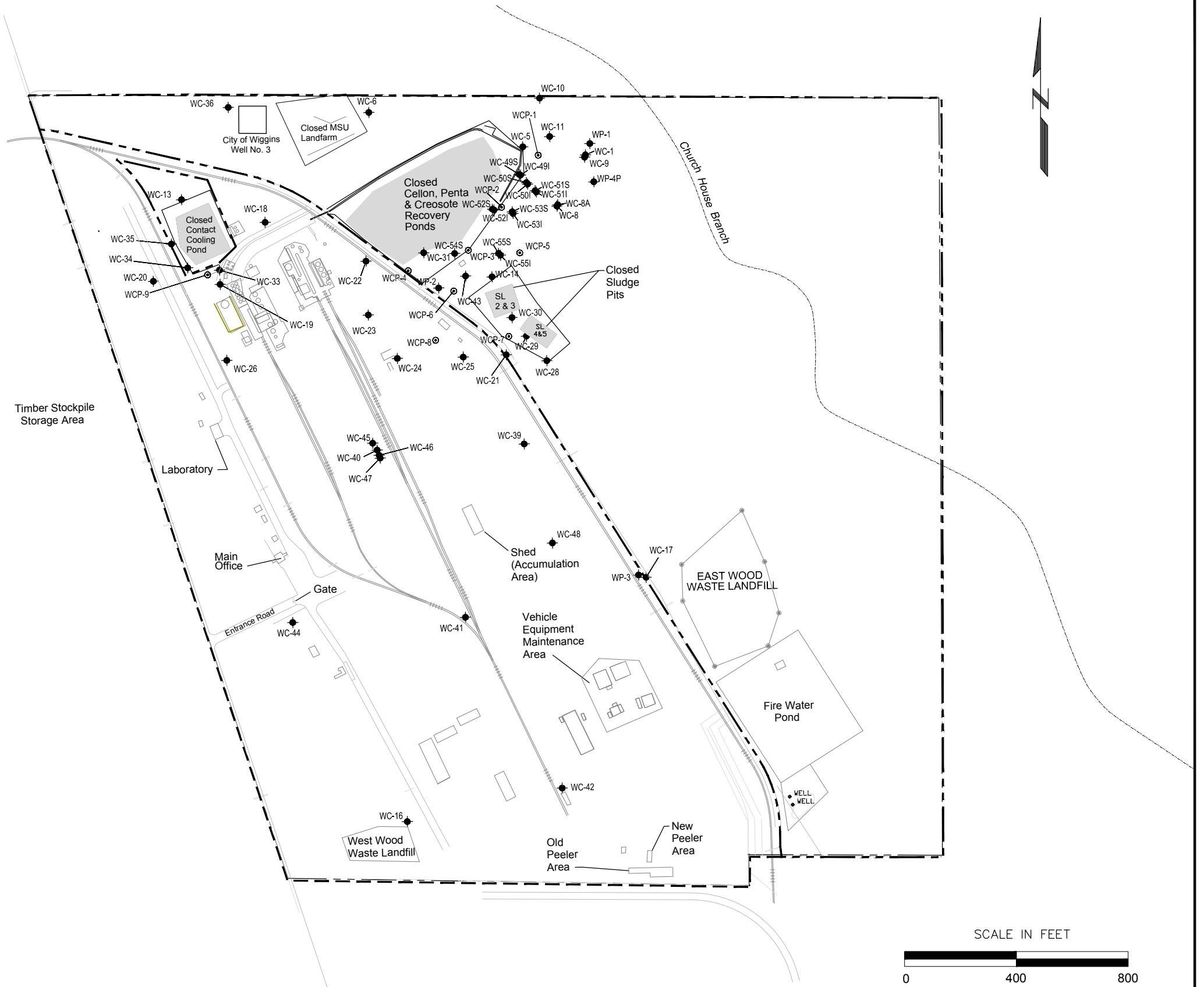
SITE LOCATION MAP

DRAWN	CHECKED	DATE	FIGURE
HVP	DA	MAR 2019	1

FILENAME: S:\INTERNATIONAL\PROJECTS\WIGGINS\Site Map\DWG\WIGGINS_Site_Map_2019.dwg (SITE MAP) US 11/19 10:11 - ipham

LEGEND

- Groundwater Monitoring Well
- Groundwater Extraction Well
- International Paper Boundary
- Baldwin Pole Boundary
- Railroad tracks
- Fenceline



INTERNATIONAL PAPER
FORMER TREATED WOOD PRODUCT FACILITY
WIGGINS, MISSISSIPPI










PROJECT NO. 02.20000006

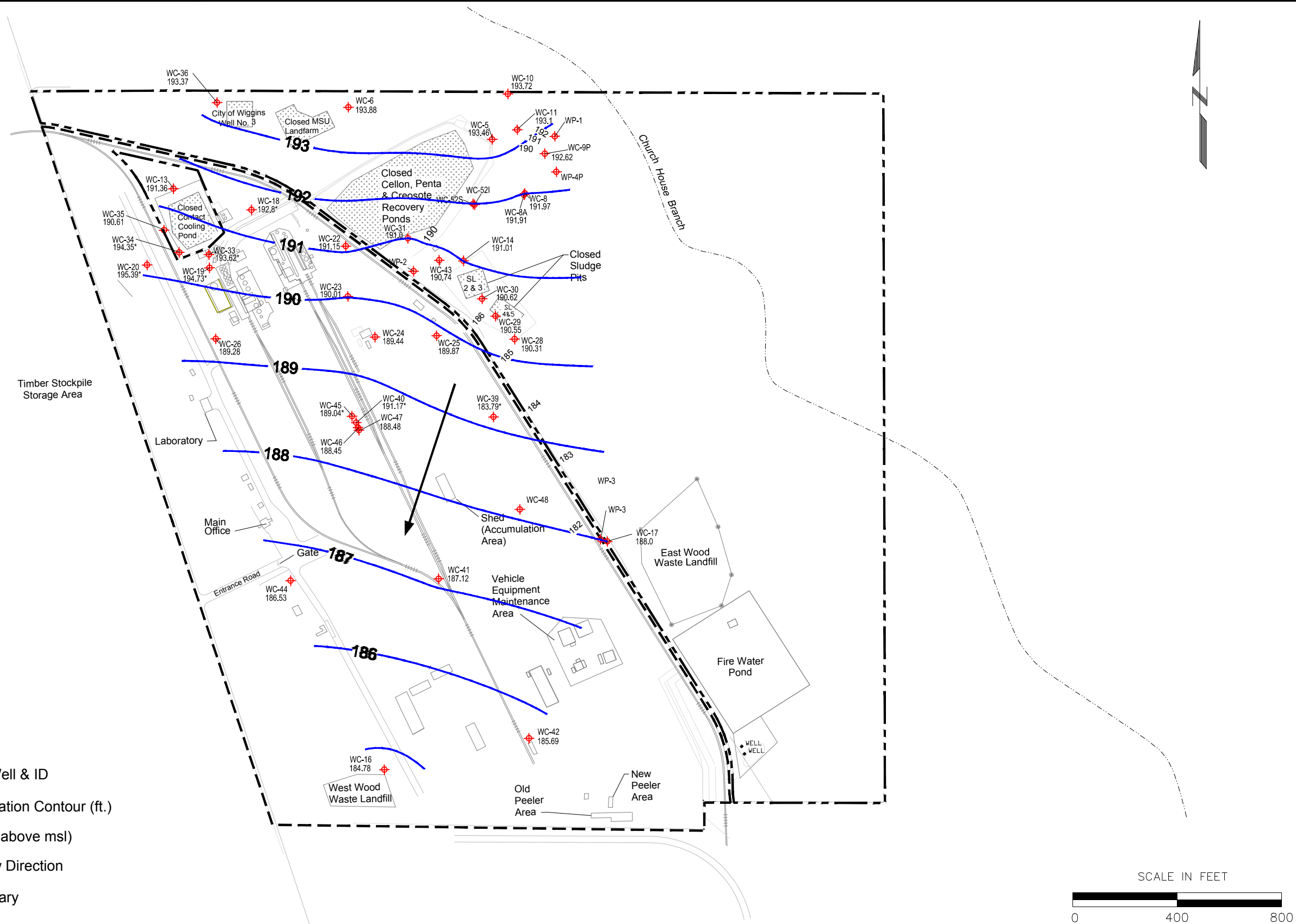
EARTHCON
EarthCon Consultants, Inc.
1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

WIGGINS FACILITY SITE MAP

DRAWN: HVP	CHECKED: MAB	DATE: FEB 2019	FIGURE: 2
------------	--------------	----------------	-----------

FILENAME: Nov 2016 S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\Monitoring Reports\2019 POT.dwg (POTMAP) 01/21/20 19:11 - hphom

- LEGEND**
-  WC-16 Groundwater Monitoring Well & ID
 -  186 Inferred Groundwater Elevation Contour (ft.)
 -  184.78 Groundwater Elevation (ft. above msl)
 -  Inferred Groundwater Flow Direction
 -  International Paper Boundary
 -  Baldwin Pole Boundary
 -  Railroad tracks
 -  * Data not used in contouring
 -  NM Not Measured



INTERNATIONAL PAPER
FORMER TREATED WOOD PRODUCTS FACILITY
WIGGINS, MISSISSIPPI

PROJECT NO. 02.20000006.90

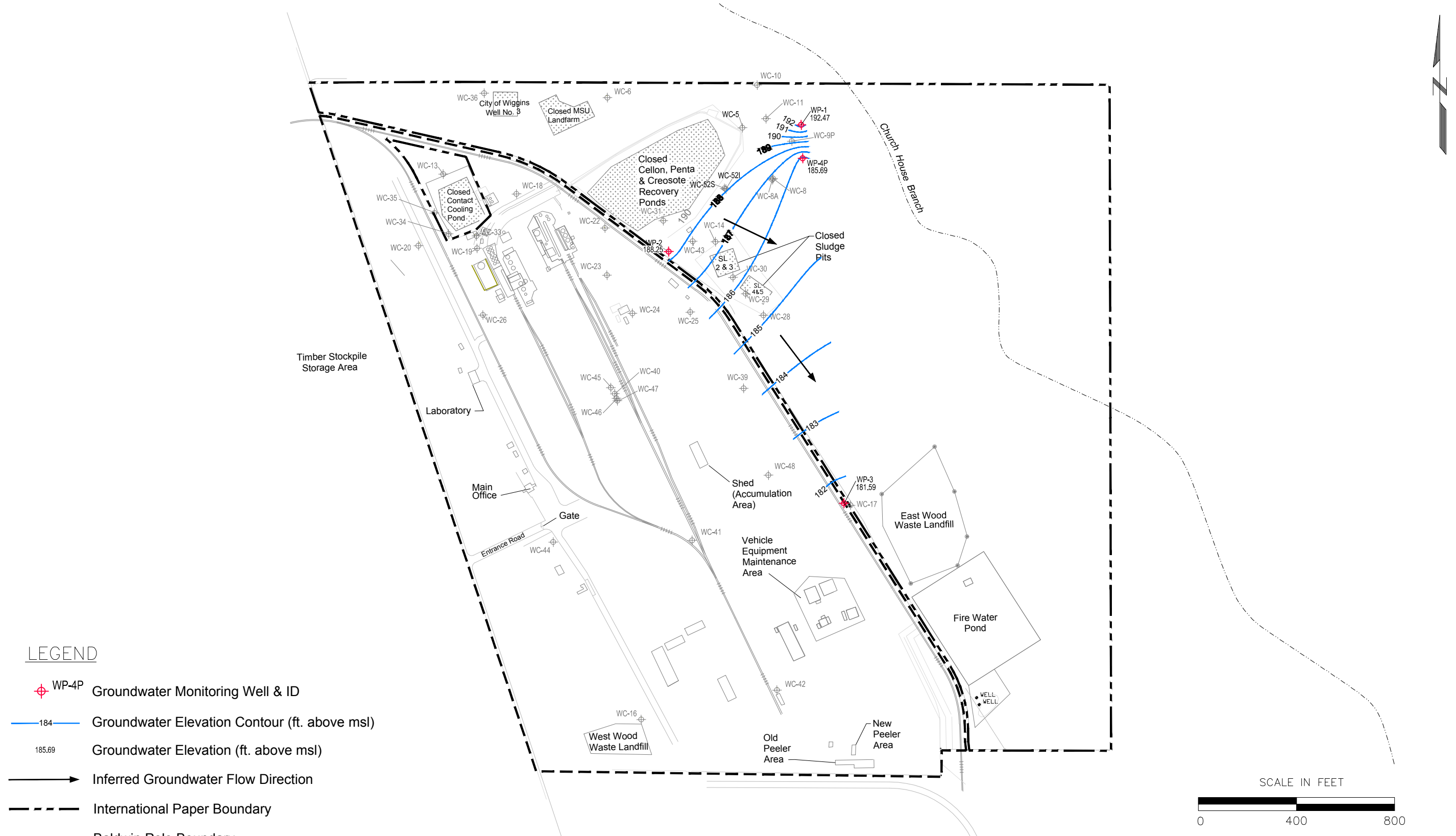
EARTHCON
EarthCon Consultants, Inc.

1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062

**CITRONELLE AQUIFER
POTENTIOMETRIC SURFACE MAP
DECEMBER 9, 2019**

DRAWN: HVP	CHECKED: DCA	DATE: DEC 13, 2019	FIGURE: 3
------------	--------------	--------------------	-----------

FILENAME: Nov 2016 S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\Monitoring Reports\2019\Dec 2019 POT PASCAGOULA.dwg (PASCAGOULA) 01/09/20 20:57 - hpham



LEGEND

- WP-4P Groundwater Monitoring Well & ID
- 184 Groundwater Elevation Contour (ft. above msl)
- 185.69 Groundwater Elevation (ft. above msl)
- Inferred Groundwater Flow Direction
- International Paper Boundary
- Baldwin Pole Boundary
- Railroad tracks

INTERNATIONAL PAPER
FORMER TREATED WOOD PRODUCTS FACILITY
WIGGINS, MISSISSIPPI

PROJECT NO. 02.20000006.90

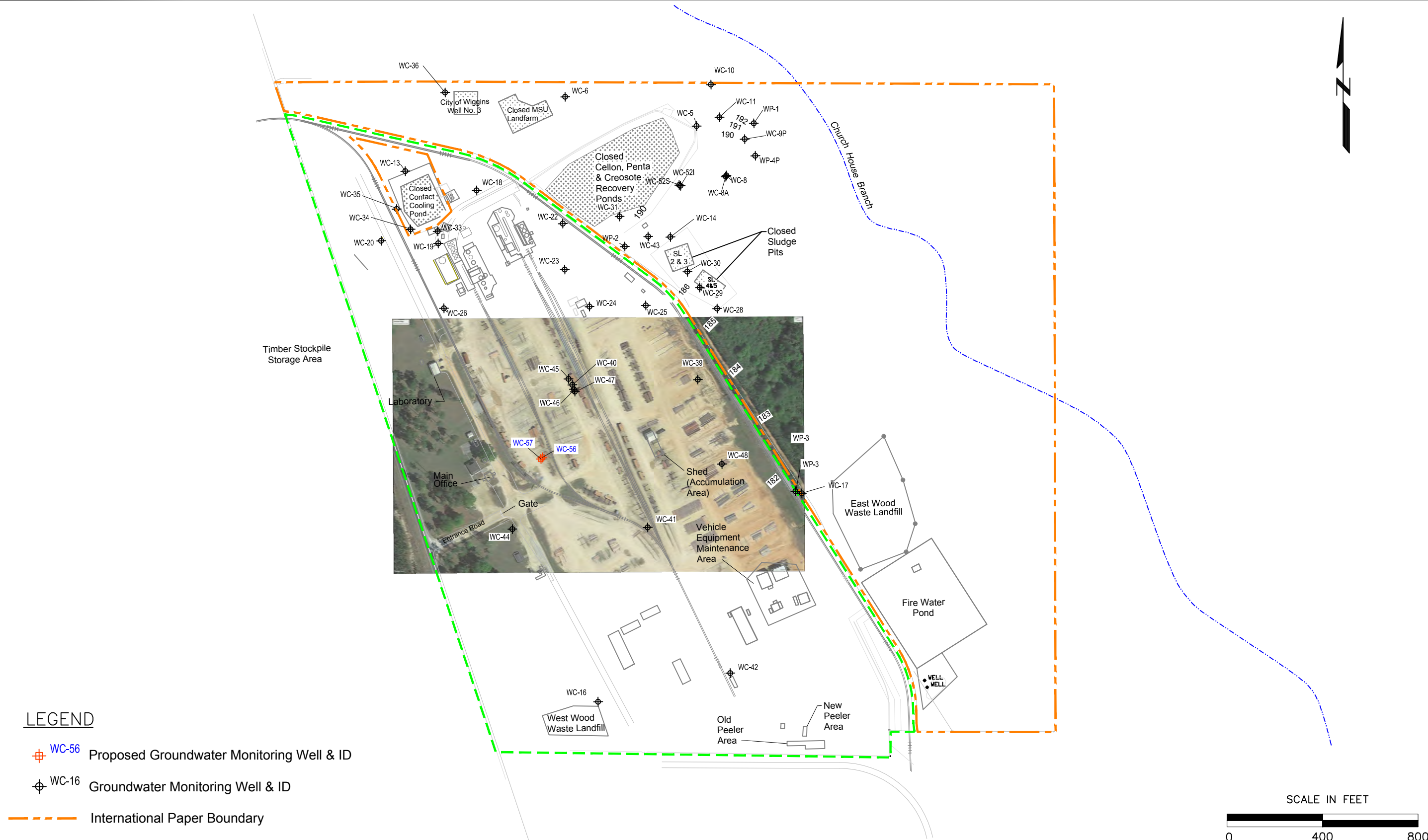
EARTHCON®
EarthCon Consultants, Inc.

1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062






PASCAGOULA AQUIFER
POTENTIOMETRIC SURFACE MAP
DECEMBER 9, 2019

DRAWN: HVP	CHECKED: DCA	DATE: DEC 16, 2019	FIGURE: 4
------------	--------------	--------------------	-----------

FILENAME: Nov 2016 S:\Premier\Projects\International Paper - SMP\Wiggins\Drawings\Monitoring Reports\2019\Proposed Monitoring Well Locations.dwg (PRP_WELLS) 01/25/20 16:14 - hpham



LEGEND

-  WC-56 Proposed Groundwater Monitoring Well & ID
-  WC-16 Groundwater Monitoring Well & ID
-  International Paper Boundary
-  Baldwin Pole Boundary
-  Railroad tracks

(Aerial Source: Google Earth Imagery 03/2019)

INTERNATIONAL PAPER FORMER TREATED WOOD PRODUCTS FACILITY WIGGINS, MISSISSIPPI PROJECT NO. 02.20000006.90	 EARTHCON EarthCon Consultants, Inc. 1880 WEST OAK PKWY, BLDG 100, STE 106, MARIETTA, GA, 30062	PROPOSED MONITORING WELL LOCATIONS MAP			
		DRAWN: HVP	CHECKED: DCA	DATE: JAN 21, 2020	FIGURE: 5

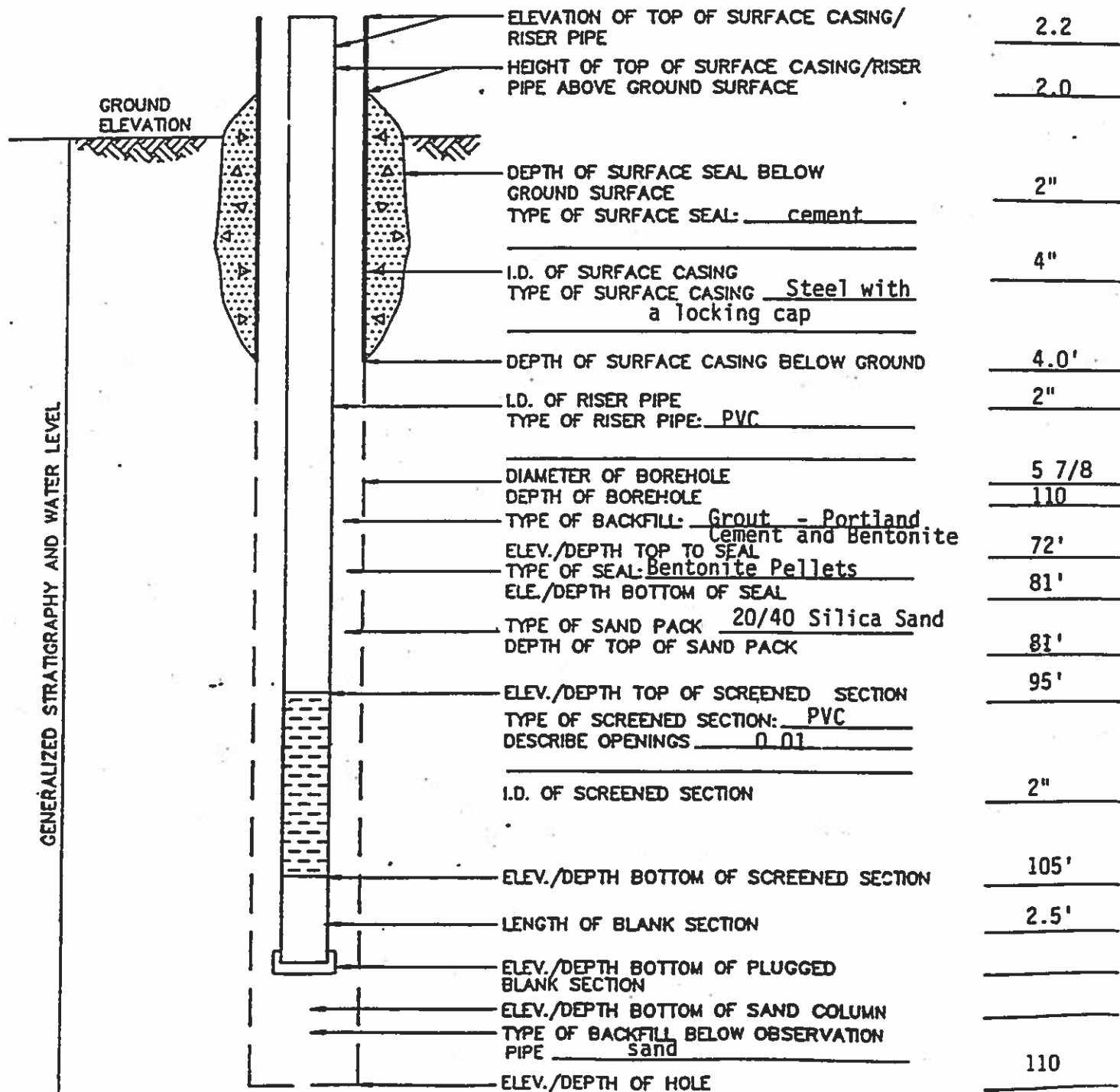
APPENDICES

APPENDIX A
SOIL BORING AND WELL CONSTRUCTION LOGS
FOR SELECT WELLS



MONITOR WELL INSTALLATION REPORT

PROJECT International Paper 91B618C PAGE 1 OF 1
 LOCATION Wiggins, Mississippi WELL NO. WC-40
 DATE COMPLETED 09/12/91 ORIGINAL DEPTH 110 AQUIFER Citronelle
 INSPECTED BY Steve Kru1 DATE 09/12/91 zone
 CHECKED BY _____ DATE _____ DEPTH INTERVAL _____



LOG OF BORING

PROJECT: **Modification to Corrective Action Program**
 LOCATION: **International Paper Company
Wiggins, Mississippi**
 CLIENT: **International Paper Company
Wiggins, Mississippi**

BORING: **WC-43**
 FILE: **91B618C**
 DATE: **2/24/93**
 TECHNICIAN: **SAK**
 APPROVED: **MEC**
 PAGE: **1 of 3**

Wash Bored: **Full Depth**

DEPTH (FEET)	SAMPLE						Description of Stratum
		S.P.T.(b/f) or P.Pen.(tsf)	OVA (ppm)	Recovery (inch)			
0							Dense dark red Silty SANDS, dry (SM)
5				12			
10				24			—with white sand streaks at 10'
15				18			
20				15			
25				19			Firm light reddish pink and yellow Silty SANDS, dry (SM)
30				20			Alternating layers of stiff dark reddish purple laminated CLAYS and reddish pink and tan SANDS (CH/SP)
35				16			Loose red, white and tan SANDS, moist (SP)
40				14			—with red, purple and yellow clay pockets at 35'
45				16			—wet to saturated at 45'
50				20			

Continued Next Page

Unified Soil Classifications based on visual observations.



LOG OF BORING

PROJECT: Modification to Corrective Action Program

LOCATION: International Paper Company
Wiggins, MississippiCLIENT: International Paper Company
Wiggins, MississippiBORING: WC-43
FILE: 91B618C
DATE: 2/24/93
TECHNICIAN: SAK
APPROVED: *MEC*
PAGE: 2 of 3

DEPTH (FEET)	SAMPLE						Description of Stratum
		S.P.T. (b/ft) or P.Pen. (tsf)	OVA (ppm)	Recovery (inch)			
50							Loose red and white medium to fine grained SANDS (SP)
55				16			—tan at 55'
60				22			
65				17			Alternating layers of purple CLAYS with yellow and red streaks and tan and dark red SANDS (CH/SP)
70				15			Firm brown SANDS, moist, with saturated tan sand and gravel (SP)
75				24			
80				22			
85				19			—with dark red and purple clay pockets at 85'
90				9			Loose tan, pink and white SANDS, saturated (SP)
95	NR						
100				7			

NR = No Recovery

Continued Next Page

Unified Soil Classifications based on visual observations.



LOG OF BORING

PROJECT: **Modification to Corrective Action Program**
 LOCATION: **International Paper Company**
Wiggins, Mississippi
 CLIENT: **International Paper Company**
Wiggins, Mississippi

BORING: **WC-43**
 FILE: **91B618C**
 DATE: **2/24/93**
 TECHNICIAN: **SAK**
 APPROVED: **WEC**
 PAGE: **3 of 3**

DEPTH (FEET)	SAMPLE						Description of Stratum
		S.P.T. (b/ft) or P.Pen. (tsf)	OVA (ppm)	Recovery (inch)			
100							Dense to firm tan SANDS, saturated (SP)
105	NR						
110				4			
115				5			
120				24			Stiff tan, yellow and light gray CLAYS (CH)
							Bottom of boring at 120'. Well WC-43 was set in borehole.

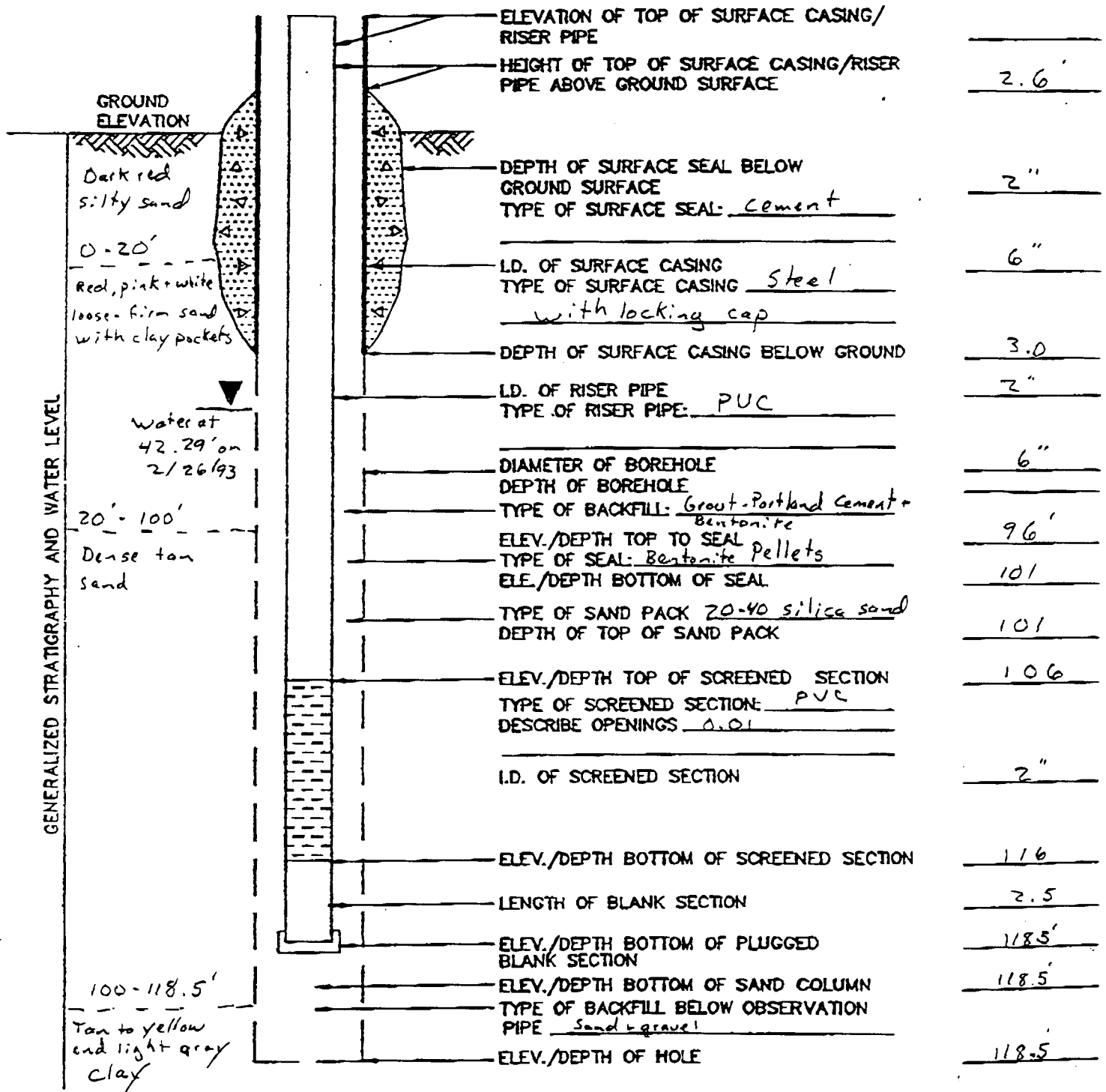
NR = No Recovery

Unified Soil Classifications based on visual observations.



MONITOR WELL INSTALLATION REPORT

PROJECT International Paper Company 91B618C PAGE 1 OF 1
 LOCATION Wiggins, Mississippi WELL NO. WC-43
 DATE COMPLETED 2/25/93 ORIGINAL DEPTH 120 AQUIFER Citronelle
 INSPECTED BY Steve Krul DATE 2/25/93 zone
 CHECKED BY _____ DATE _____ DEPTH INTERVAL _____



State Well Report

Part 1 - Driller's Log

Mississippi Department of Environmental Quality
Office of Land and Water Resources
P.O. Box 10631
Jackson, MS 39289-0631
(601)961-5210
(601)354-6938 (fax)

County: Stone

Permit #: _____

Driller: 0578

Date drilling completed: 6-6-05

For Office Use Only:

Aquifer: _____

Well #: _____

L. S. Elevation: _____

E-log #: _____

State Law requires that this report be prepared by the license holder responsible for the work and filed with the Department at the above address within 30 days of completion of drilling of the well or borehole.

Information on Well Owner <small>(Landowner if borehole is not for a water well)</small>	Well or Borehole Location
Owner Name <u>International Paper</u>	Latitude: <u>30° 50' 09"</u> Longitude: <u>89° 07' 36"</u>
Mailing Address: _____	Method of Lat/Long (circle one): Conventional Survey, <u>USGS quad</u> , Hand-held GPS, Survey-grade GPS
City _____ State _____ Zip Code _____	<u>NE</u> 1/4 <u>NW</u> 1/4 Sec <u>31</u> Twn <u>25</u> Rng <u>11W</u>
Telephone No. (____) _____	Distance _____ Miles Direction _____ of Nearest Town <u>Wiggins</u>
Well / Borehole Data	
Date drilling started: <u>6-6-05</u> Date drilling completed: <u>6-6-05</u> Hole depth: <u>64</u> Hole diameter: <u>8.5"</u>	
Location of the source of any surface water used for drilling: <u>HSA Drilling Technique</u>	
Method of dosing and volume of Chlorine used in drilling and development: <u>NA</u>	
Logs run (circle all applicable): No log run <input type="checkbox"/> Electric <input type="checkbox"/> Gamma Ray <input type="checkbox"/> Density <input type="checkbox"/> Sonic <input type="checkbox"/> Neutron <input type="checkbox"/> Other: <u>NA</u>	
Name of organization running log(s): <u>NA</u>	
Purpose of borehole (check one): Water Well <input type="checkbox"/> Geotechnical/Geological Investigation <input type="checkbox"/> Ground Source Heat Pump <input type="checkbox"/>	
Seismic Survey <input type="checkbox"/> Other (describe) <u>monitor well</u>	
<i>If drilling is not related to water well construction, skip the remainder of this block</i>	
Purpose of Well (check one): Home <input type="checkbox"/> Industrial <input type="checkbox"/> Public Supply <input type="checkbox"/> Irrigation <input type="checkbox"/> Fish Culture <input type="checkbox"/> Other: <u>monitor</u>	
If a flowing well, method of flow regulation: Valve _____ Other (describe) _____	
Static Water Level: _____ feet above or below (circle one) land surface Date measured: _____	
Method of Measurement (circle one) steel tape <input type="checkbox"/> electric tape <input type="checkbox"/> air line <input type="checkbox"/> other: _____	
Well depth: <u>64</u> Well grouted to a depth of <u>40</u> feet Type of grout (circle one): <u>Neat Cement</u> Bentonite <input type="checkbox"/> Mix <input type="checkbox"/>	
Casing length: <u>44</u> feet Casing diameter: <u>2</u> inches Type of casing: <u>PVC</u>	
Screen length: <u>20</u> feet Screen diameter: <u>2</u> inches Type of screen: <u>PVC</u>	
Screen slot size: <u>.010</u> inches Setting depth: From <u>44</u> feet to <u>64</u> feet	
Type of completion (circle all applicable): Gravel packed <input type="checkbox"/> Underreamed <input type="checkbox"/> Telescoped <input type="checkbox"/> Open hole <input type="checkbox"/> Natural Development <input type="checkbox"/>	
Other (describe): <u>8" Flush mount</u>	
Top of lap pipe or reduction in casing: _____ feet. <i>If telescoped or more than one screen, describe on next page</i>	

Form: OLWR-SWR-1A

Ground Level

Signature of Licensee



WC-44

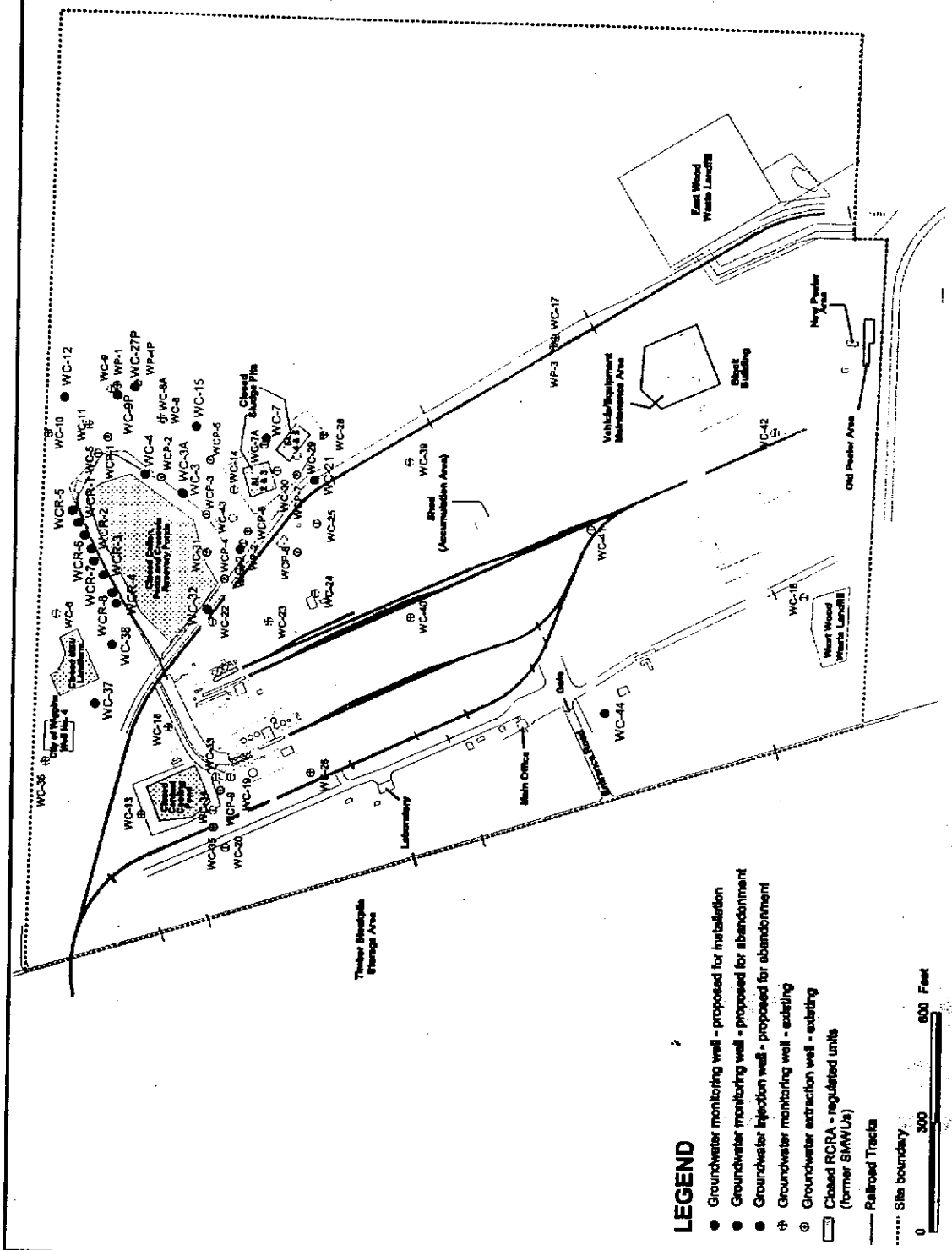


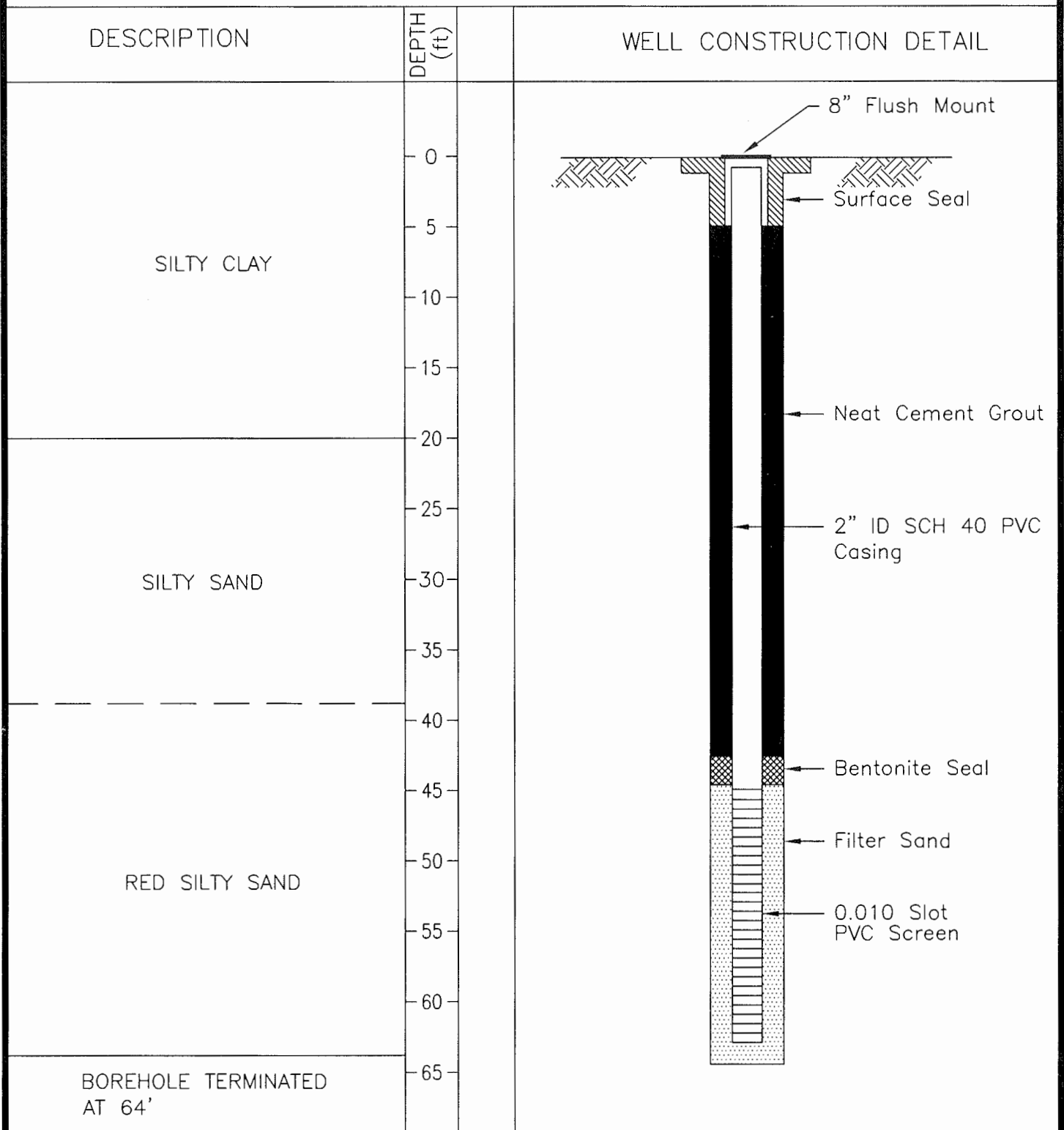
Figure 2. Wiggins facility site map

MONITORING WELL WC-44

Well ID: WC-44
 Driller: WALKER-HILL
 Logged By: PREMO

Date: 6-6-05



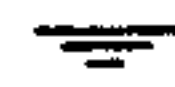


Hole Dia.: 8.5"
 Drill Method: HSA



BORING RECORD

Surface Elev. (Feet)	Depth (Feet)	Description	Unified Soil Classif.	Penetration Resistance, "N" Blows per Foot											Sample Data	Remarks
223.24		Soil sampling started at 54.5'. (See Boring WC-8 for 0 to 54.5')														
	54.5	CITRONELLE FORMATION: Firm to dense, white and tan silty fine to medium sand with thin purple silty clay layers	SM												X	NO
	55.0															
	60.0														X	NO
	65.0														X	NO
	70.0														X	NO
	75.0														X	NO
	80.0														X	NO
	84.0															
	85.0	Very dense yellow silty medium sand													X	NO
	90														X	NO

Date Drilled 8/8/84
 Drilling Method Rotary
 Drilled By POPE
 Logged By M. Jewett
 Checked By S.L.W.

 Standard Penetration Test
 Undisturbed Sample
 Water Table (24 Hour)
 Water Table (Time of Boring)
 Laboratory Test Location

SO Strong contaminant odor
 WO Weak to moderate contaminant odor
 NO No contaminant odor





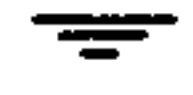


JAMES L. GRANT & ASSOCIATES
 geotechnical engineering • management •
 computer science
 ENGLEWOOD, COLORADO

Boring Number WC-8A
 Job Number 804024
 Page 1 of 2

BORING RECORD

Elev. (Feet)	Depth (Feet)	Description	Unified Soil Classif.	Penetration Resistance, "N" Blows per Foot 10 20 30 40 50 60 70 80 90										Sample Data	Remarks
	90.0	(See 84.0' to 90.0')													
	95.0														
	100.0		SM												
	105.0	Same													
	108.6														
	110.0	PASCAGOULA FORMATION: Very hard													
	110.5	yellow and grey silty clay	CH												
		Boring terminated @ 110.5'													
	115.0														

Date Drilled 8/8/84
 Drilling Method Rotary
 Drilled By POPE
 Logged By M. Jewett
 Checked By S.L.W.

 Standard Penetration Test
 Undisturbed Sample
 Water Table (24 Hour)
 Water Table (Time of Boring)
 Laboratory Test Location

SO Strong contaminant odor
 WO Weak to moderate contaminant odor
 NO No contaminant odor

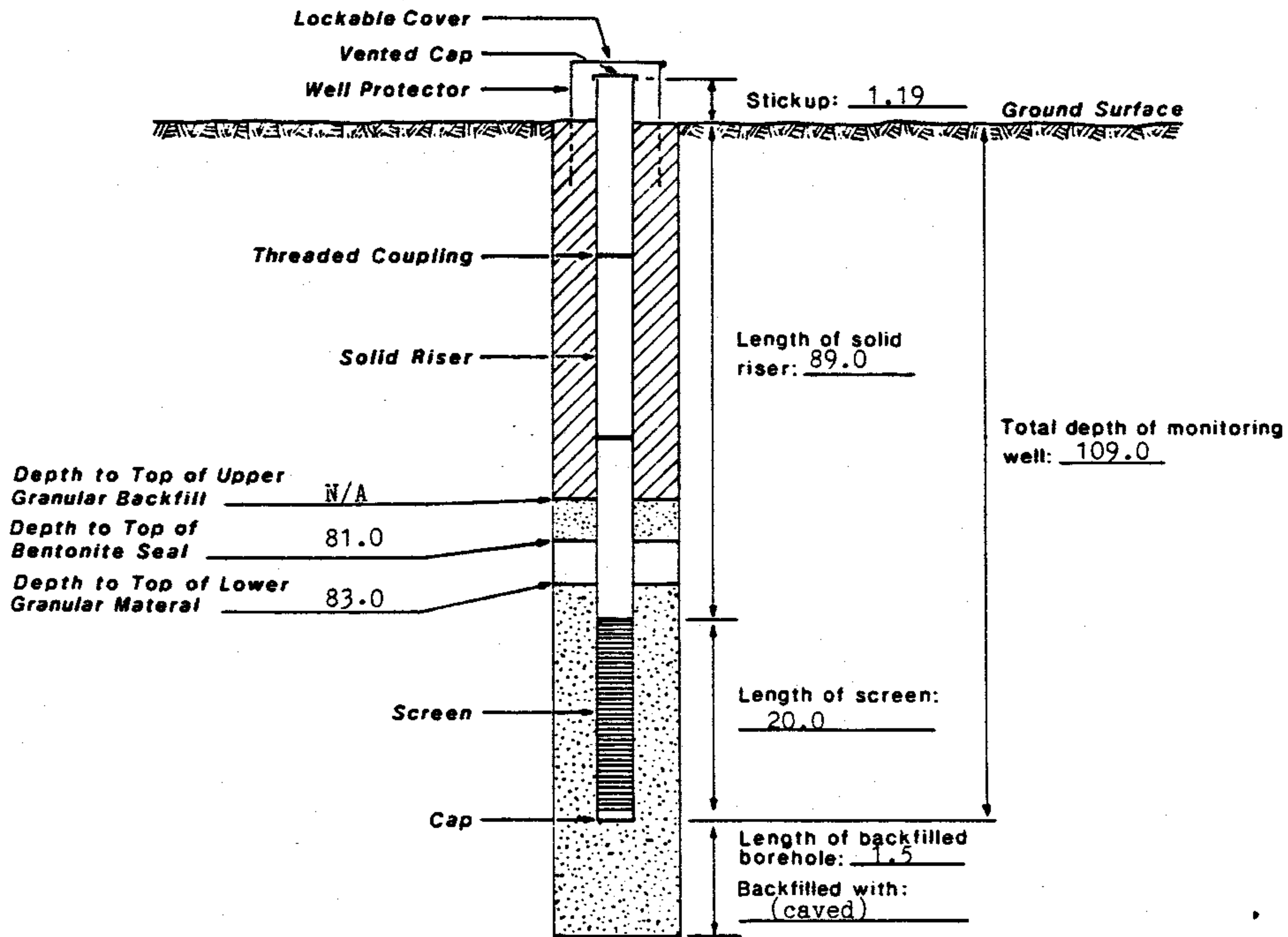





JAMES L. GRANT & ASSOCIATES
 geotechnical engineering • management •
 computer science
 ENGLEWOOD, COLORADO

Boring Number WC-8A
 Job Number 804024
 Page 2 of 2

MONITORING WELL INSTALLATION RECORD

Job Name IP WIGGINS TWP Well Number WC-8A
 Job Number 804024 Installation Date 8/8/84 Location Wiggins, MS
 Datum Elevation 224.43 Ground Surface Elevation 223.24
 Datum for Water Level Measurement Black mark on top of PVC casing
 Screen Diameter & Material 2" i.d. SCH 40 PVC Slot Size 0.005"
 Riser Diameter & Material 2" i.d. SCH 40 PVC Borehole Diameter 6 3/4"
 Granular Backfill Material Fine gravel JLGA Representative M. Jewett
 Drilling Method Rotary wash Drilling Contractor POPE



-  : Grout
-  : Bentonite
-  : Granular Backfill

(Not to Scale)

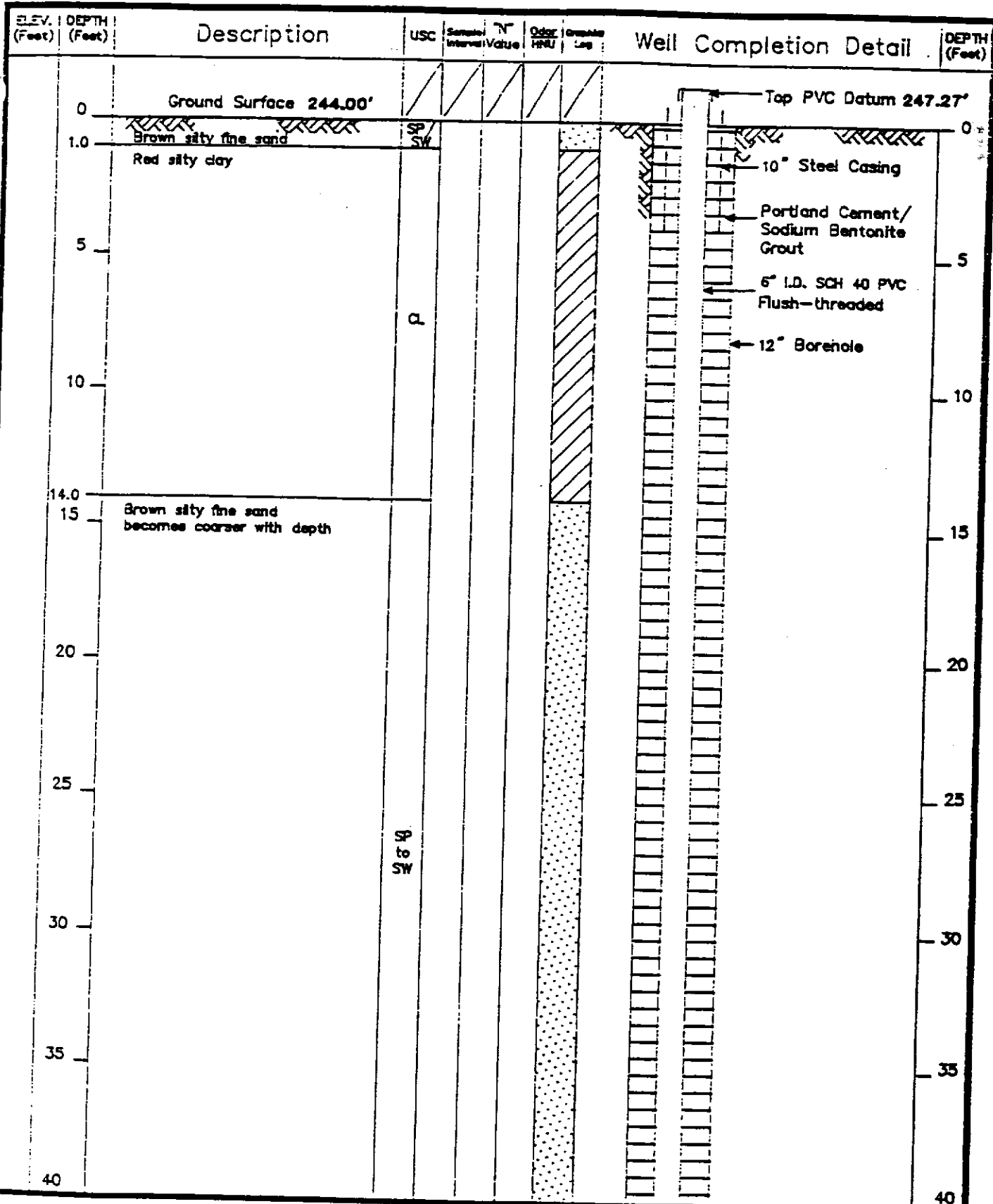
Stabilized water level 31.92 feet below datum.
 Measured on 8/31/84



JAMES L. GRANT & ASSOCIATES
 geotechnical engineering • management •
 computer science
 ENGLEWOOD, COLORADO

WELL WC-8A

MONITORING WELL
 INSTALLATION RECORD



JAMES L. GRANT & ASSOCIATES
 geotechnical engineering • management •
 computer science
 DENVER, COLORADO

Monitoring Well Record WCP-8

Location IP TWP FACILITY - WIGGINS, MS

Coordinates 9091.19 N 51487.83 E

Drilled By Cole's Clearwater Drilling Method Rotary wash

Logged By CMJ

Checked By SLW






Installation Date November 8, 1988

Page 1 of 3

TEST BORING RECORD

ELEV. (ft msl)	DEPTH FEET	DESCRIPTION	UNIFIED	PENETRATION RESISTANCE, "N" BLOWS PER FOOT											SAMPLE TYPE OR CORE DATA	REMARKS
205.79	0	Topsoil: Grey silty fine SAND		0	10	20	30	40	50	60	70	80				
	2.5		SM													grab sample NO
	5	Citronelle Formation: firm to very firm reddish-brown or yellow silty fine to medium SAND.														
	10		SM													
	15															
	17.5															
	20	Loose to very firm tan slightly silty fine to medium SAND.														
	25		SP													
	30															
	32.5															
	35	Firm tan slightly clayey gravelly silty fine to medium SAND.	SM													
	37.5	Very loose to loose tan to white slightly silty fine to medium SAND with occassional silt or clay seams	SP													
	40															

DATE DRILLED 5/10-11/83
 DRILLING METHOD rotary wash
 DRILLED BY H. Carnley
 LOGGED BY WWE
 CHECKED BY SLW

 STANDARD PENETRATION TEST
 WATER TABLE 24 HR
 WATER TABLE TIME OF BORING
 UNDISTURBED SAMPLE
 LABORATORY TEST LOCATION

BORING NUMBER WT-1
 JOB NUMBER 812073

PAGE 1 of 4

SO STRONG CONTAMINANT ODOR
 WO WEAK TO MODERATE CONTAMINANT ODOR
 NO NO CONTAMINANT ODOR

TEST BORING RECORD

ELEV. (ft msl)	DEPTH FEET	DESCRIPTION	UNIFIED	PENETRATION RESISTANCE, "N" BLOWS PER FOOT						SAMPLE TYPE OR CORE DATA	REMARKS
	40	Same as 37.5' to 40.0'									
	45	White, silty clay layer @ 44.9' to 45.3'	SP								
	47.5										
	50	Very loose to very dense white to tan silty fine to medium SAND with occassional thin red clayey silt layers and occassional gravel.								L	
	55		SM								
	60										
	65										
	67.5										
	70	Very dense tan slightly silty fine to medium SAND with occassional trace gravel and red clayey silt layers.	SP								
	75										
	80										

DATE DRILLED 5/10-11/83
 DRILLING METHOD rotary wash
 DRILLED BY H. Carnley
 LOGGED BY WWB
 CHECKED BY SLW

☒ STANDARD PENETRATION TEST
☐ WATER TABLE 24 HR
☐ WATER TABLE
 TIME OF BORING
☐ UNDISTURBED SAMPLE
 L LABORATORY TEST
 LOCATION

BORING NUMBER WP-1
 JOB NUMBER 612073
 PAGE 2 of 4

SO STRONG CONTAMINANT ODOR
 WO WEAK TO MODERATE
 CONTAMINANT ODOR
 NO NO CONTAMINANT ODOR

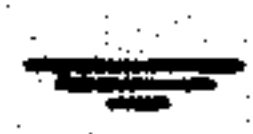
TEST BORING RECORD

ELEV. (ft msl)	DEPTH FEET	DESCRIPTION	UNIFIED	PENETRATION RESISTANCE, "N" BLOWS PER FOOT							SAMPLE TYPE OR CORE DATA	REMARKS
				0	10	20	30	40	50	60		
	80	Same as 67.5' to 80.0'	SP									
	82.5											
	85	Very dense tan silty fine to medium SAND.	SM								50/6'	NO
	87.5											
	90	Very dense tan slightly silty fine to medium sand	SP								L	NO
	94.0											
	95	Pascagoula Formation (?): very stiff to very hard gray slightly sandy clayey SILT, some iron mottling.										no recovery, but traces of clayey silt on spoon.
		Well rounded quartz and chert gravel @ 95.5' to 96.2'									50/6'	NO
	100	Reddish-brown clayey sandy silt layer @ 99.0'.	CL								L	NO
	105											
	107.5											
	110	Hard tan to gray fine sandy clayey SILT, some iron mottling.	ML									NO
	115											
	117.5	Very firm to dense light gray to reddish-brown clayey silty fine SAND; occasional reddish-brown sandy silt laminations	SM									NO
	120											

DATE DRILLED 5/10-11/83
 DRILLING METHOD rotary wash
 DRILLED BY H. Carnley
 LOGGED BY WWE
 CHECKED BY SLW



STANDARD PENETRATION TEST



WATER TABLE 24 HR



WATER TABLE
TIME OF BORING



UNDISTURBED SAMPLE



LABORATORY TEST
LOCATION

BORING NUMBER WF-1

JOB NUMBER 812073

PAGE 3 of 3

SO STRONG CONTAMINANT ODOR
 WO WEAK TO MODERATE CONTAMINANT ODOR
 NO NO CONTAMINANT ODOR

TEST BORING RECORD

Boring Record														
ELEV. (ft msl)	DEPTH FEET	DESCRIPTION	UNIFIED	PENETRATION RESISTANCE, "N" BLOWS PER FOOT							SAMPLE TYPE OR CORE DATA	REMARKS		
				0	10	20	30	40	60	80				
	120	Same as 117.5' to 120.0'	SM											
	125													NO
	130													NO
	135	Reddish-brown silty fine to medium sand layer @ 134.0'.												NO
	140												L	NO
	142.5	Very firm light gray clayey silty fine to medium SAND.												
140.29	145													NO
	145.5	Boring Terminated @ 145.5'												

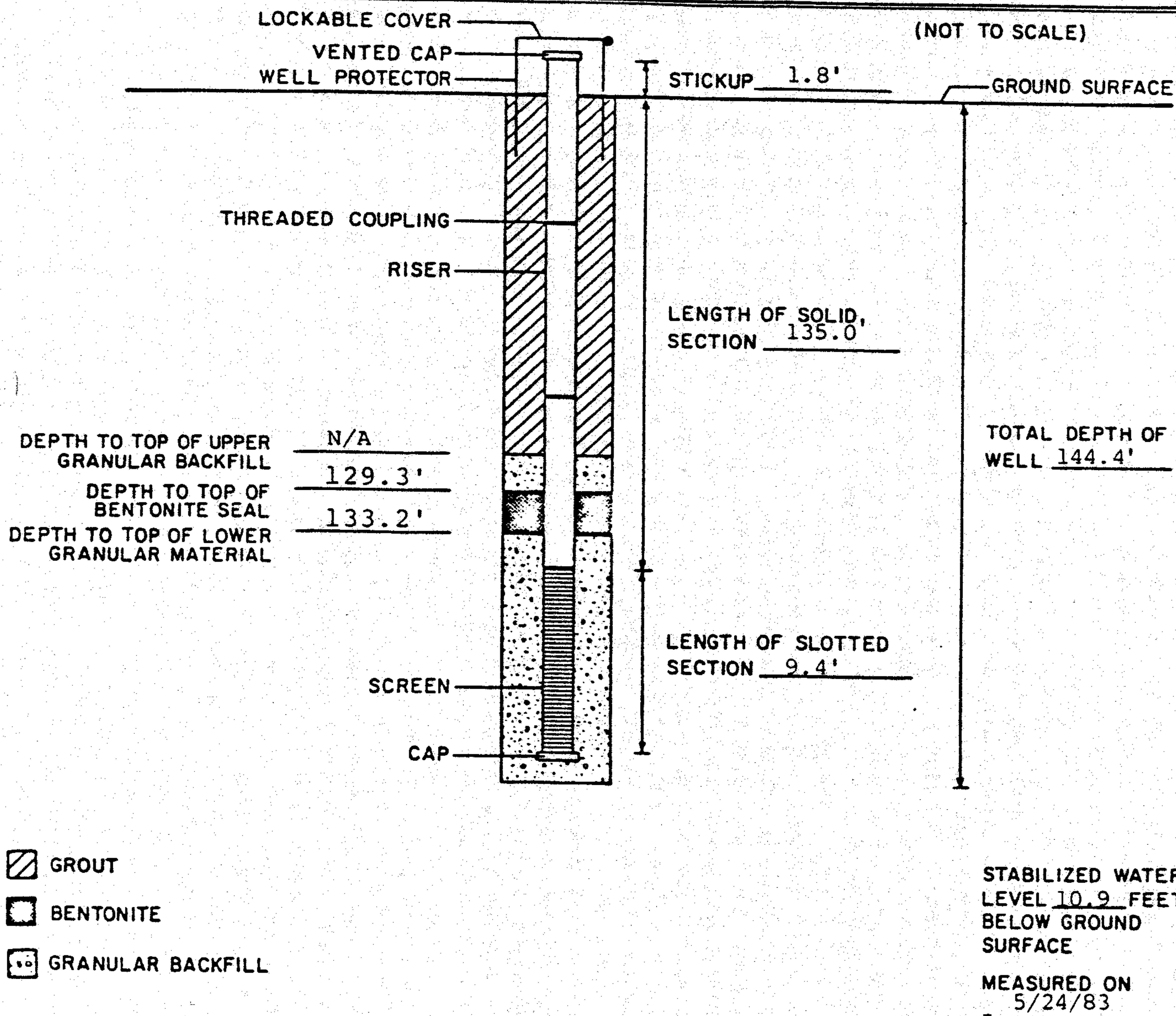
DATE DRILLED 5/10-11/83
 DRILLING METHOD rotary wash
 FILLED BY H. Carnley
 LOGGED BY WWE
 CHECKED BY SLW

☒ STANDARD PENETRATION TEST
☐ WATER TABLE 24 HR
☐ WATER TABLE TIME OF BORING
☐ UNDISTURBED SAMPLE
☐ LABORATORY TEST LOCATION

BORING NUMBER WF-1
 JOB NUMBER 812073
 PAGE 4 of 4
 SO STRONG CONTAMINANT ODOR
 WO WEAK TO MODERATE CONTAMINANT ODOR
 NO NO CONTAMINANT ODOR

TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME IP-Wiggins WELL NUMBER WP-1
JOB NUMBER 812073 INSTALLATION DATE 5/10-13/83 LOCATION refer to location map
DATUM ELEVATION 207.56' msl GROUND SURFACE ELEVATION 205.79' msl
DATUM FOR WATER LEVEL MEASUREMENT top PVC casing
SCREEN DIAMETER AND MATERIAL 2" i.d. schedule 40 PVC SLOT SIZE .010"
2" i.d. schedule
RISER DIAMETER AND MATERIAL 40 PVC BOREHOLE DIAMETER 8"
Gravelly silty
GRANULAR BACKFILL MATERIAL fine-coarse sand LAW ENGINEERING W. Bath
FIELD REPRESENTATIVE
DRILLING TECHNIQUE rotary wash DRILLING CONTRACTOR Law-Birmingham



LAW ENGINEERING TESTING COMPANY

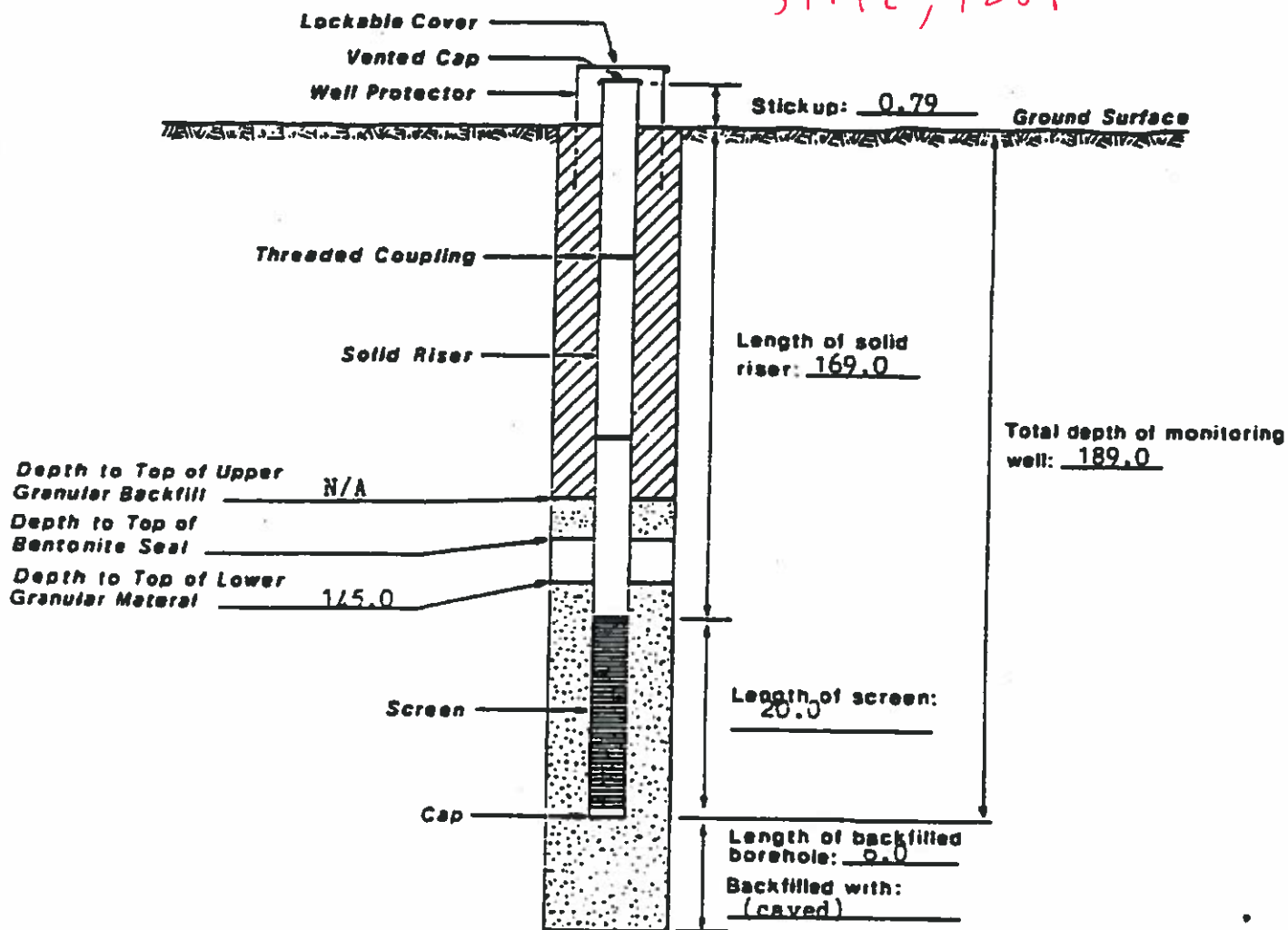
DENVER, COLORADO

TYPE II MONITORING WELL WP-1
INSTALLATION RECORD

MONITORING WELL INSTALLATION RECORD

Job Name TP WIGGINS TWP Well Number WP-2
 Job Number 80/024 Installation Date 8/15/84 Location Wiggins, MS
 Datum Elevation 239.39 Ground Surface Elevation 238.60
 Datum for Water Level Measurement Top of PVC casing
 Screen Diameter & Material 2" i.d. SCH 40 PVC Slot Size 0.005"
 Riser Diameter & Material 2" i.d. SCH 40 PVC Borehole Diameter 4 3/4"
 Granular Backfill Material Fine gravel JLGA Representative M. Jewett
 Drilling Method Rotary wash Drilling Contractor POPE

51492, 9289



(Not to Scale)

Stabilized water level 50.61 feet below datum.

Measured on 8/31/84








JAMES L. GRANT & ASSOCIATES
 geotechnical engineering & management &
 computer science
 ENGLEWOOD, COLORADO

WELL WP-2

MONITORING WELL
INSTALLATION RECORD

Surface Elev. (Feet)	Depth (Feet)	Description	Unified Soil Classif.	Penetration Resistance, "N" Blows per Foot											Sample Data	Remarks
119.00		No samples taken from 0 to 119.0'. See log of WC-2 for interval between 0 and 69.5.														
	119.0	CITRONELLE FORMATION: Very dense red and pink fine to medium silty sand	SM													
	120.0															
	123.0	Hard yellow and grey silty clay with trace of very fine sand	CH													
	125.0															
	130.0	Very stiff to hard blue-grey silty clay														
	132.5															
	135.0															
	140.0															
	145.0															
	150.0															
	155.0															

Borehole Drilled 8/15/84
 Drilling Method Rotary
 Drilled By POPE
 Logged By M. Jewett
 Checked By S.J.W.

 Standard Penetration Test
 Undisturbed Sample
 Water Table (24 Hour)
 Water Table (Time of Boring)
 Laboratory Test Location

SO Strong contaminant odor
 WO Weak to moderate contaminant odor
 NO No contaminant odor








JAMES L. GRANT & ASSOCIATES
 geotechnical engineering & management &
 computer science
 ENGLEWOOD, COLORADO

Boring Number WP-2
 Job Number 304024
 Page 1 of 2

BORING RECORD

Elev. (Feet)	Depth (Feet)	Description	Unified Soil Classif	Penetration Resistance, "N" Blows per Foot 10 20 30 40 50 60 70 80 90	Sample Data	Remarks
	155.0	See 132.5 to 155.0	CH		X	NO
	160.0					
	165.0				X	NO
	170.0	Very hard blue-grey fine sandy silt and thin organic streaks below 185.0'	ML			
	171.0					
	175.0				X	NO
	180.0					
	185.0				X	NO
	187.5					
	190.0	Very hard blue-grey silty clay				
	195.0				X	NO
		Boring terminated @ 195.0'				

Date Drilled 8/15/84
 Drilling Method Rotary
 Drilled By POPE
 geo By M. Jewett
 checked By S.J.W.

 Standard Penetration Test
 Undisturbed Sample
 Water Table (24 Hour)
 Water Table (Time of Boring)
 Laboratory Test Location

SO Strong contaminant odor
 WO Weak to moderate contaminant odor
 NO No contaminant odor



JAMES L. GRANT & ASSOCIATES

geotechnical engineering & management &
 computer science

ENGLEWOOD, COLORADO

Boring Number WP-2

Job Number 804022

Page 2 of 2

APPENDIX B
PHOTOGRAPHS

Data Gap Investigation Work Plan
International Paper Company – Closed Former Wood Treating Site Units



Photograph of one of three monitoring wells observed inside the closed units on December 10, 2019.

APPENDIX C
FIELDWORK DOCUMENTATION FORMS



Groundwater Sampling Record

WELL No.		PROJECT #		LOCATION		DATE		
SAMPLE No.		PROJECT NAME		FIELD PERSONNEL/COMPANY				
SAMPLE TIME:		SITE		FIELD CONDITIONS/WEATHER				
Well Condition Inspection (circle one)				Equipment Cleaning Procedures				
cover: locked not locked				- potable water and phosphate-free soap				
number: legible not legible				- potable water rinse				
outer casing: good fair poor				- water rinse: distilled deionized				
inner casing: good fair poor				- solvent rinse: acetone hexane				
well photographed: yes no				- air dry				
Casing Diameter: (circle one) 2" 4" 6" Other: _____		Casing Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft ³) Casing Volume (gallons/ft) for: 2" = 0.163; 4" = 0.653; 6" = 1.47						
Depth to Water (feet): _____				Measuring Point Elevation (feet): _____				
Depth of Well (feet): _____				Groundwater Surface Elevation: _____				
Water Column (feet): _____				LNAPL present: _____ thickness: _____				
Casing Volume (gallons): _____				DNAPL present: _____ thickness: _____				
Calculated Purge Volume (gallons): _____				Remarks: _____				
Actual Purge Volume (gallons): _____								
Well Evacuation								
Water level recovery is: very slow slow moderate fast Bailed dry: yes no								
TIME 2400 hrs	CUMULATIVE VOLUME (gal)	TEMP (°C)	pH	CONDUCTIVITY (μs/cm, 25°C)	DISSOLVED OXYGEN (mg/L)	Eh (mV)	TURBIDITY (NTU)	ODOR/COLOR/ REMARKS
	0							PURGE START
Measurement and Sampling Equipment								
Type	Manufacturer			Model #		Calibration Date		
pH/ORP/Cond/DO/Temp	_____			_____		_____		
Turbidity	_____			_____		_____		
SS Bladder Pump	_____			_____		_____		
SAMPLE NUMBER	ANALYTICAL METHOD			BOTTLE TYPE/ PRESERVATIVES		QA REMARKS		

Photo Log
IP-Wiggins, MS
June 2020 Data Gap Investigation Field Activities



Photo 1: WC-57 & WC-56 Well Locations
June 15, 2020



Photo 2: Recovered Soil Cores-WC-57
June 15, 2020



Photo 3: Recovered Soil Cores-WC-57
Top to Bottom 50'-140' bgs. June 15, 2020



Photo 4: Pascagoula Formation contact at 142'bgs (nearest soil core 140' bgs (bottom right) to 150' bgs (top left)).

Photo Log
IP-Wiggins, MS
June 2020 Data Gap Investigation Field Activities



Photo 5: Packer Assembly
June 17, 2020



Photo 6: Well Abandonment
June 17, 2020



Photo 7: Well Abandonment
June 17, 2020



Photo 8: Survey Activities
June 18, 2020

BORING NUMBER WC-56



LOCATION MAP



FACILITY NAME IP WIGGINS FORMER TREATED WOOD PRODUCTS PLANT

FAC. E.P.A./STATE I.D.# MSD980600084 LOCATION WIGGINS, MISSISSIPPI

TOTAL WELL DEPTH (ft) 105 BOREHOLE DIA. (in) 6 1/2" WELL COMPLETION FLUSH MOUNT


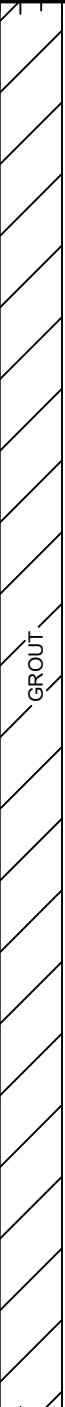

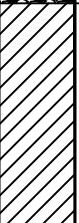
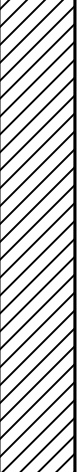




CASING DIA. (in) 2 TYPE PVC SCREEN LENGTH (ft) 10 SLOT SIZE (in) 0.010


DRILLING CO. WALKER-HILL DRILLING METHOD Rotosonic


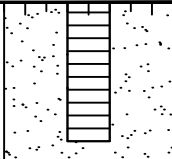

GEOLOGIST Norm Kennel DATE DRILLED 6/16/2020

TOP OF CASING ELEV. (ft MSL) 245.09 GROUND SURFACE ELEV. (ft MSL) 245.84

NORTHING 484909.07 EASTING 891769.51

DEPTH (feet)	TYPE	INT./REC.	ANALYSIS	HEADSPACE READING (ppm)	LITHOLOGIC LOG	SOIL CLASSIFI- CATION	LITHOLOGIC DESCRIPTION/ COMMENTS	WELL CONSTRUCTION DETAILS			DEPTH (feet)	
								2' X 2' VAULT 4' X 4' CONCRETE PAD				
0		100%	PID	< 1.0		GP/ SP	Hand Auger. Fill Material, Sand and Gravel	8-1/4" BORHOLE		2" SCHEDULE 40 PVC		0
5		10%	PID	< 1.0		CL	RED-BROWN SILTY CLAY, Poor Recovery					5
10		100%	PID	< 1.0			RED-BROWN SILTY CLAY, WITH SAND AND SAND LENSES					10
15							15					
20												20
25		100%	PID	< 1.0		SM	SALMON SILT AND SAND, INTERBEDDED WITH YELLOW CLAY AND SILT	25				
30											30	
35												35
40		100%	PID	< 1.0		SP-SM	PINK SAND WITH SILT, REDDISH-WHITE SAND AND CLAY POCKETS	40				
			PID	< 1.0		SW	YELLOW-BROWN SAND, TRACE CLAY					
45		100%	PID	< 1.0			RED SAND, TRACE CLAY AND SILT, SLIGHTLY MOIST, cont'd to next page	45				

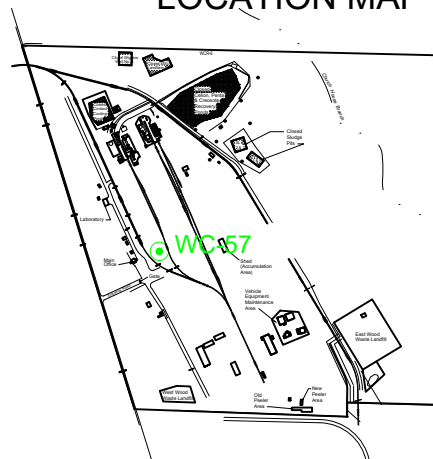
DEPTH (feet)		LITHOLOGIC DESCRIPTION/ COMMENTS					WELL CONSTRUCTION DETAILS		DEPTH (feet)
DEPTH (feet)	TYPE	INT./REC.	ANALYSIS	HEADSPACE READING (ppm)	LITHOLOGIC LOG	SOIL CLASSIFICATION			DEPTH (feet)
45									45
50									50
55		100%	PID	< 1.0		SW	RED SAND, TRACE CLAY AND SILT, SLIGHTLY MOIST		55
60									60
65									65
70							LIGNITE BAND		70
75									75
80									80
85		100%	PID	< 1.0		SP	PINK-YELLOW SAND, WELL-SORTED, MOIST, VERY SLIGHT ODOR FROM 75' TO 85', PERIODIC CLAY STRINGERS.		85
90							MOTTLED YELLOW CLAY IN SHOE		90
95									95
100									100
COMMENTS							<div> <div>SCREEN PACK SAND</div> <div>2" SCHEDULE 40 PVC</div> <div>SCREEN PACK SAND</div> <div>BENTONITE SEAL</div> </div>		
BORING# WC-56 FACILITY NAME INTERNATIONAL PAPER									

DEPTH (feet)		TYPE	INT./REC.	ANALYSIS	HEADSPACE READING (ppm)	LITHOLOGIC LOG	SOIL CLASSIFI- CATION	LITHOLOGIC DESCRIPTION/ COMMENTS	WELL CONSTRUCTION DETAILS	DEPTH (feet)
100			100%	PID	< 1.0		SP	PINK-YELLOW SAND, WELL-SORTED, MOIST		100
105								BORING TERMINATED AT 105 FT.		105
110										110
115										115
120										120
125										125
130										130
135										135
140										140
145										145
150										150
155										155
BORING# WC-56 FACILITY NAME INTERNATIONAL PAPER								COMMENTS		

BORING NUMBER WC-57



LOCATION MAP



FACILITY NAME IP WIGGINS FORMER TREATED WOOD PRODUCTS PLANT

FAC. E.P.A./STATE I.D.# MSD980600084 LOCATION WIGGINS, MISSISSIPPI

TOTAL WELL DEPTH (ft) 145 BOREHOLE DIA. (in) 6 1/2" WELL COMPLETION FLUSH MOUNT


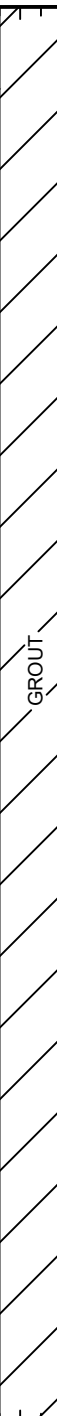
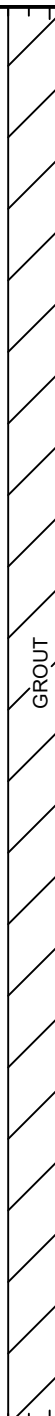




CASING DIA. (in) 2 TYPE PVC SCREEN LENGTH (ft) 10 SLOT SIZE (in) 0.010


DRILLING CO. WALKER-HILL DRILLING METHOD Rotosonic

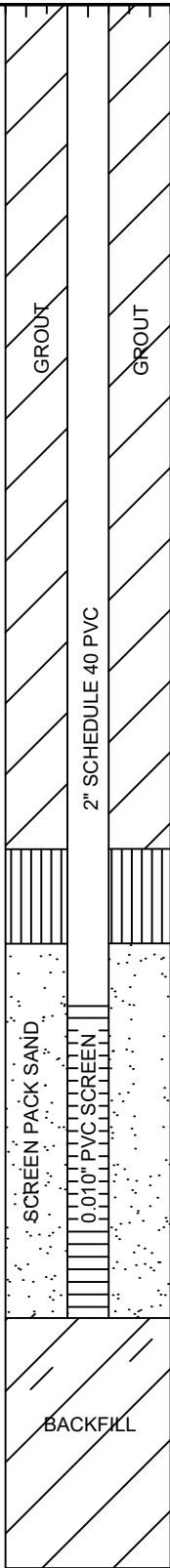

GEOLOGIST Norm Kennel DATE DRILLED 6/15/2020 - 6/16/2020

TOP OF CASING ELEV. (ft MSL) 245.11 GROUND SURFACE ELEV. (ft MSL) 245.82

NORTHING 484909.07 EASTING 891769.51

DEPTH (feet)	TYPE	INT./REC.	ANALYSIS	HEADSPACE READING (ppm)	LITHOLOGIC LOG	SOIL CLASSIFI- CATION	LITHOLOGIC DESCRIPTION/ COMMENTS	WELL CONSTRUCTION DETAILS			DEPTH (feet)	
								2' X 2' VAULT 4' X 4' CONCRETE PAD				
0		100	PID	< 1.0		GP/ SP	Hand Auger. Fill Material, Sand and Gravel	8-1/4" BORHOLE		2" SCHEDULE 40 PVC		0
5		10%	PID	< 1.0		CL	RED-BROWN SILTY CLAY, Poor Recovery					5
10				< 1.0			RED-BROWN SILTY CLAY, WITH SAND AND SAND LENSES					10
15		100%	PID									15
20						20						
25						SM	SALMON SILT AND SAND, INTERBEDDED WITH YELLOW CLAY AND SILT	25				
30		100%	PID	< 1.0				30				
35								35				
40		100%	PID	< 1.0		SP-SM	PINK SAND WITH SILT, REDDISH-WHITE SAND AND CLAY POCKETS	40				
45							45					
			PID	< 1.0		SW	YELLOW-BROWN SAND, TRACE CLAY					
		100%	PID	< 1.0			RED SAND, TRACE CLAY AND SILT, SLIGHTLY MOIST, cont'd to next page					

DEPTH (feet)		LITHOLOGIC DESCRIPTION/ COMMENTS					WELL CONSTRUCTION DETAILS		DEPTH (feet)	
TYPE		INT./REC.	ANALYSIS	HEADSPACE READING (ppm)	LITHOLOGIC LOG	SOIL CLASSIFI- CATION				
45		100%	PID	< 1.0		SW	RED SAND, TRACE CLAY AND SILT, SLIGHTLY MOIST			45
50										50
55										55
60										60
65										65
70		100%	PID	< 1.0		SP	LIGNITE BAND	GROUT	2" SCHEDULE 40 PVC	70
75										75
80							PINK-YELLOW SAND, WELL-SORTED, MOIST, VERY SLIGHT ODOR FROM 75' TO 85'	GROUT		80
85										85
90							MOTTLED YELLOW CLAY IN SHOE			90
95										95
100										100
BORING# WC-57 FACILITY NAME INTERNATIONAL PAPER							COMMENTS			

DEPTH (feet)	TYPE	INT./REC.	ANALYSIS	HEADSPACE READING (ppm)	LITHOLOGIC LOG	SOIL CLASSIFI- CATION	LITHOLOGIC DESCRIPTION/ COMMENTS	WELL CONSTRUCTION DETAILS	DEPTH (feet)
100									100
105		100%	PID	< 1.0		SP	PINK-YELLOW SAND, WELL-SORTED, MOIST		105
110		100%	PID	< 1.0		GP/SW	YELLOW - BROWN SAND AND GRAVEL, COARSENS DOWNWARD		110
115							THIN CLAY LENSES AT 117' AND 119'		115
120		100%	PID	< 1.0			PINK-YELLOW SAND		120
125									125
130		100%	PID	< 1.0		SP	LIGHT BROWN-TAN SAND, WELL SORTED		130
135		100%	PID	< 1.0		SW	RED BROWN SAND AND GRAVEL		135
140		100%	PID	< 1.0		SW	BROWN SAND AND GRAVEL		140
145		100%	PID	< 1.0		SP	BROWN SAND, FINE GRAINED		145
150						CH	BLUE-GRAY CLAY, STIFF (PASCAGOULA)		150
155							BORING TERMINATED AT 150 FT.		155
							COMMENTS	 <p>The diagram shows a cross-section of the well construction. From top to bottom, it includes: a casing with grout, a 2" SCHEDULE 40 PVC pipe, a screen pack sand section with a 0.010" PVC screen, and a backfill section. A bentonite seal is indicated at the bottom of the screen pack sand section.</p>	
							BORING# <u>WC-57</u> FACILITY NAME <u>INTERNATIONAL PAPER</u>		
									

STATE WELL REPORT

Part 1

Driller's Log

Mississippi Department of Environmental Quality
Office of Land and Water Resources
P.O. Box 2309
Jackson, MS 39225-2309
(601)961-5555
(601)961-5228 (fax)

County: _____
Permit #: _____
Driller: _____
Date drilling completed: _____

For Office Use Only:

Well #: _____
Aquifer: _____
E-Log #: _____

State Law requires that this report be prepared by the license holder responsible for the work and filed with the Department at the above address within 30 days of completion of drilling of the well or borehole.

Well Owner Information (Landowner if borehole is not for a water well)	Well or Borehole Location
Owner Name: _____	Latitude: _____ Longitude: _____
Mailing Address: _____ _____	Method of Lat/Long (check one): Conventional Survey_____, USGS quad_____, Hand-held GPS_____, Survey-grade GPS_____ _____ 1/4 _____ 1/4, Sec _____ T _____ R _____ _____ Miles _____ of _____ (Distance) (Direction) (Nearest Town)
City _____ State _____ Zip Code _____	
Telephone No. (____) _____	

Well / Borehole Data
Date drilling started: _____ Date drilling completed: _____ Hole depth: _____ Hole diameter: _____
Location of the source of any surface water used for drilling: _____
Method of dosing and volume of Chlorine used in drilling and development: _____
Logs run (check all applicable): No log run Electric Gamma Ray Density Sonic Neutron Other: _____
Name of organization running log(s): _____
Purpose of borehole (check one): Water Well Geotechnical/Geological Investigation Ground Source Heat Pump Seismic Survey Other (describe) _____
<i>If drilling is not related to water well construction, skip the remainder of this block</i>
Purpose of Well (check all applicable): Home Industrial Public Supply Irrigation Fish Culture Other (describe): _____
If a flowing well, method of flow regulation: Valve _____ Other (describe) _____
Static Water Level: _____ feet [above or below] land surface Date measured: _____ (check one)
Method of measurement (check one): Steel tape Electric tape Air line Other (describe): _____
Well depth: _____ Well grouted to a depth of: _____ feet Type of grout (check one): Neat Cement Bentonite Mix
Casing length: _____ feet Casing diameter: _____ inches Type of casing: _____
Screen length: _____ feet Screen diameter: _____ inches Type of screen: _____
Screen slot size: _____ inches Setting depth: From _____ feet to _____ feet
Type of completion (check all applicable): Gravel packed Underreamed Open hole Natural Development Other (describe): _____
Top of lap pipe or reduction in casing: _____ feet <i>If telescoped or more than one screen, describe on next page</i>

Permit #: _____

Well #: _____

The diagram illustrates a cross-section of a riser assembly. It consists of a central vertical riser tube. Surrounding this tube is a layer of Bentonite Pellets, which is further enclosed by a layer of Cement/Bentonite. The entire assembly is supported by a base layer of 20/40 Sand Filler, which is topped with a Screen. The riser tube itself is shown with a central vertical channel and a surrounding annular space.

[illegible]

Landowner Name: _____

Signature of Licensee

STATE WELL REPORT

Part 1

Driller's Log

Mississippi Department of Environmental Quality
Office of Land and Water Resources
P.O. Box 2309
Jackson, MS 39225-2309
(601)961-5555
(601)961-5228 (fax)

County: _____
Permit #: _____
Driller: _____
Date drilling completed: _____

For Office Use Only:

Well #: _____
Aquifer: _____
E-Log #: _____

State Law requires that this report be prepared by the license holder responsible for the work and filed with the Department at the above address within 30 days of completion of drilling of the well or borehole.

Well Owner Information (Landowner if borehole is not for a water well)	Well or Borehole Location
Owner Name: _____	Latitude: _____ Longitude: _____
Mailing Address: _____	Method of Lat/Long (check one): Conventional Survey_____,
_____	USGS quad_____, Hand-held GPS_____, Survey-grade GPS_____
_____	_____ 1/4 _____ 1/4, Sec _____ T _____ R _____
City _____ State _____ Zip Code _____	_____ Miles _____ of _____
Telephone No. (_____) _____	(Distance) (Direction) (Nearest Town)

Well / Borehole Data
Date drilling started: _____ Date drilling completed: _____ Hole depth: _____ Hole diameter: _____
Location of the source of any surface water used for drilling: _____
Method of dosing and volume of Chlorine used in drilling and development: _____
Logs run (check all applicable): No log run Electric Gamma Ray Density Sonic Neutron Other: _____
Name of organization running log(s): _____
Purpose of borehole (check one): Water Well Geotechnical/Geological Investigation Ground Source Heat Pump
Seismic Survey Other (describe) _____
<i>If drilling is not related to water well construction, skip the remainder of this block</i>
Purpose of Well (check all applicable): Home Industrial Public Supply Irrigation Fish Culture
Other (describe): _____
If a flowing well, method of flow regulation: Valve _____ Other (describe) _____
Static Water Level: _____ feet [above or below] land surface Date measured: _____ (check one)
Method of measurement (check one): Steel tape Electric tape Air line Other (describe): _____
Well depth: _____ Well grouted to a depth of: _____ feet Type of grout (check one): Neat Cement Bentonite Mix
Casing length: _____ feet Casing diameter: _____ inches Type of casing: _____
Screen length: _____ feet Screen diameter: _____ inches Type of screen: _____
Screen slot size: _____ inches Setting depth: From _____ feet to _____ feet
Type of completion (check all applicable): Gravel packed Underreamed Open hole Natural Development
Other (describe): _____
Top of lap pipe or reduction in casing: _____ feet
<i>If telescoped or more than one screen, describe on next page</i>

Permit #: _____

Well #: _____

The diagram illustrates a cross-section of a riser assembly. It consists of a central vertical riser tube. Surrounding this tube is a layer of Bentonite Pellets, which is further enclosed by a layer of Cement/Bentonite. The entire assembly is supported by a base layer of 20/40 Sand Filler, which is topped with a Screen. The riser tube itself is shown with a central vertical channel and a surrounding annular space.

[illegible]

Landowner Name: _____

Signature of Licensee

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
Office of Land and Water Resources
P. O. Box 2309
Jackson, MS 39225
Water Well Plugging/Decommissioning Form
OLWR-DF-1 (04/08)
(601)961-5555 (601)961-5228 (fax)

COUNTY WELL LOCATED:		WELL NUMBER:	
PERMIT NUMBER:		DATE WELL PLUGGED:	
NAME OF FIRM PLUGGING WELL:		TELEPHONE NUMBER:	
NAME AND ADDRESS OF CURRENT LANDOWNER:			
WELL LOCATION:	SECTION:	TOWNSHIP:	RANGE:
WELL LOCATION: LATITUDE: LONGITUDE: METHOD (Check ONE): (1) USGS QUAD (2) CONVENTIONAL SURVEY (3) GPS – HAND HELD OR SURVEY GRADE			
DISTANCE:	DIRECTION:	NEAREST TOWN:	OTHER LANDMARK:
WELL PURPOSE (HOME, IRRIGATION, MUNICIPAL, ETC.):			
NAME OF WELL CONTRACTOR WHO DRILLED THE WELL:			
NAME OF LANDOWNER WHEN WELL WAS DRILLED:			

WELL DATA		
WELL DEPTH:		HOLE DEPTH:
CASING DIAMETER (IN.):	CASING LENGTH (FT.):	TYPE OF CASING:
DEPTH TO STATIC WATER LEVEL:		DATE WELL COMPLETED:
WHY IS THE WELL BEING ABANDONED?		

DESCRIBE HOW THE WELL OR HOLE WAS PLUGGED (AMOUNT OF CASING AND/OR SCREEN THAT WAS REMOVED OR LEFT IN HOLE, MATERIAL AND AMOUNT USED IN PLUGGING, METHOD OF PLACING MATERIAL, ETC.)

I CERTIFY THAT THE WELL WAS PLUGGED OR ABANDONED IN ACCORDANCE WITH THE STATE OF MISSISSIPPI REGULATIONS.	
<div style="text-align: center;"> <div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> <div style="margin: 5px 0;">PRINT NAME</div> <div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> <div style="margin: 5px 0;">SIGNATURE</div> </div>	<div style="text-align: center;"> <div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> <div style="margin: 5px 0;">MS LICENSE NUMBER</div> <div style="border-bottom: 1px solid black; width: 100px; margin: 0 auto;"></div> <div style="margin: 5px 0;">DATE</div> </div>

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
Office of Land and Water Resources
P. O. Box 2309
Jackson, MS 39225
Water Well Plugging/Decommissioning Form
OLWR-DF-1 (04/08)
(601)961-5555 (601)961-5228 (fax)

COUNTY WELL LOCATED: Stone		WELL NUMBER: WC-49I
PERMIT NUMBER:		DATE WELL PLUGGED: 6/17/20
NAME OF FIRM PLUGGING WELL: Walker-Hill Environmental, Inc		TELEPHONE NUMBER: 601-736-3500
NAME AND ADDRESS OF CURRENT LANDOWNER: International Paper, Emily Lee, 6400 Poplar Avenue, Memphis, TN 38197		
WELL LOCATION:	SECTION: 31	TOWNSHIP: 2S RANGE: 11W
WELL LOCATION: LATITUDE: 30°50'01" LONGITUDE: 89°07'38" METHOD (Check ONE): <input checked="" type="checkbox"/> USGS QUAD <input type="checkbox"/> CONVENTIONAL SURVEY <input type="checkbox"/> GPS - HAND HELD OR SURVEY GRADE		
DISTANCE: 1.8	DIRECTION: S	NEAREST TOWN: Wiggins OTHER LANDMARK:
WELL PURPOSE (HOME, IRRIGATION, MUNICIPAL, ETC.): Injection		
NAME OF WELL CONTRACTOR WHO DRILLED THE WELL: Walker-Hill Environmental, Inc.		
NAME OF LANDOWNER WHEN WELL WAS DRILLED: International Paper		

WELL DATA		
WELL DEPTH: 92.5		HOLE DEPTH: 92.5
CASING DIAMETER (IN.): 2"	CASING LENGTH (FT.): 72.5	TYPE OF CASING: PVC
DEPTH TO STATIC WATER LEVEL:		DATE WELL COMPLETED: 2007
WHY IS THE WELL BEING ABANDONED? Well not used		

DESCRIBE HOW THE WELL OR HOLE WAS PLUGGED (AMOUNT OF CASING AND/OR SCREEN THAT WAS REMOVED OR LEFT IN HOLE, MATERIAL AND AMOUNT USED IN PLUGGING, METHOD OF PLACING MATERIAL, ETC.)
Checked Well. Well was then grouted with cement
bentonite slurry pumped by tremie pipe from the bottom of the well to ground surface.
Finished by covering site with native materials.

I CERTIFY THAT THE WELL WAS PLUGGED OR ABANDONED IN ACCORDANCE WITH THE STATE OF MISSISSIPPI REGULATIONS.	
Gary P. Hill <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <div style="text-align: center;"> <small>PRINT NAME</small> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <small>SIGNATURE</small> </div>	<div style="text-align: center;"> 0-578 <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <small>MS LICENSE NUMBER</small> </div> <div style="text-align: center;"> 7/8/2020 <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <small>DATE</small> </div>

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
Office of Land and Water Resources
P. O. Box 2309
Jackson, MS 39225
Water Well Plugging/Decommissioning Form
OLWR-DF-1 (04/08)
(601)961-5555 (601)961-5228 (fax)

COUNTY WELL LOCATED: Stone		WELL NUMBER: WC-501
PERMIT NUMBER:		DATE WELL PLUGGED: 6/17/20
NAME OF FIRM PLUGGING WELL: Walker-Hill Environmental, Inc		TELEPHONE NUMBER: 601-736-3500
NAME AND ADDRESS OF CURRENT LANDOWNER: International Paper, Emily Lee, 6400 Poplar Avenue, Memphis, TN 38197		
WELL LOCATION:	SECTION: 31	TOWNSHIP: 2S RANGE: 11W
WELL LOCATION: LATITUDE: 30°50'01" LONGITUDE: 89°07'39" METHOD (Check ONE): <input checked="" type="checkbox"/> USGS QUAD <input type="checkbox"/> CONVENTIONAL SURVEY <input type="checkbox"/> GPS - HAND HELD OR SURVEY GRADE		
DISTANCE: 1.8	DIRECTION: S	NEAREST TOWN: Wiggins OTHER LANDMARK:
WELL PURPOSE (HOME, IRRIGATION, MUNICIPAL, ETC.): Injection		
NAME OF WELL CONTRACTOR WHO DRILLED THE WELL: Walker-Hill Environmental, Inc.		
NAME OF LANDOWNER WHEN WELL WAS DRILLED: International Paper		

WELL DATA		
WELL DEPTH: 75.68		HOLE DEPTH: 75.68
CASING DIAMETER (IN.): 2"	CASING LENGTH (FT.): 55.68	TYPE OF CASING: PVC
DEPTH TO STATIC WATER LEVEL:		DATE WELL COMPLETED: 2007
WHY IS THE WELL BEING ABANDONED? Well not used		

DESCRIBE HOW THE WELL OR HOLE WAS PLUGGED (AMOUNT OF CASING AND/OR SCREEN THAT WAS REMOVED OR LEFT IN HOLE, MATERIAL AND AMOUNT USED IN PLUGGING, METHOD OF PLACING MATERIAL, ETC.)
Checked Well. Well was then grouted with cement
bentonite slurry pumped by tremie pipe from the bottom of the well to ground surface.
Finished by covering site with native materials.

I CERTIFY THAT THE WELL WAS PLUGGED OR ABANDONED IN ACCORDANCE WITH THE STATE OF MISSISSIPPI REGULATIONS.	
Gary P. Hill <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <div style="text-align: center;"> <small>PRINT NAME</small> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <small>SIGNATURE</small> </div>	<div style="text-align: center;"> 0-578 <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <small>MS LICENSE NUMBER</small> </div> <div style="text-align: center;"> 7/8/2020 <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <small>DATE</small> </div>

June 26, 2020

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

EarthCon Consultants, Inc - Marietta, GA

Sample Delivery Group: L1231761
Samples Received: 06/20/2020
Project Number: 02.20000006.20
Description: IP Wiggins

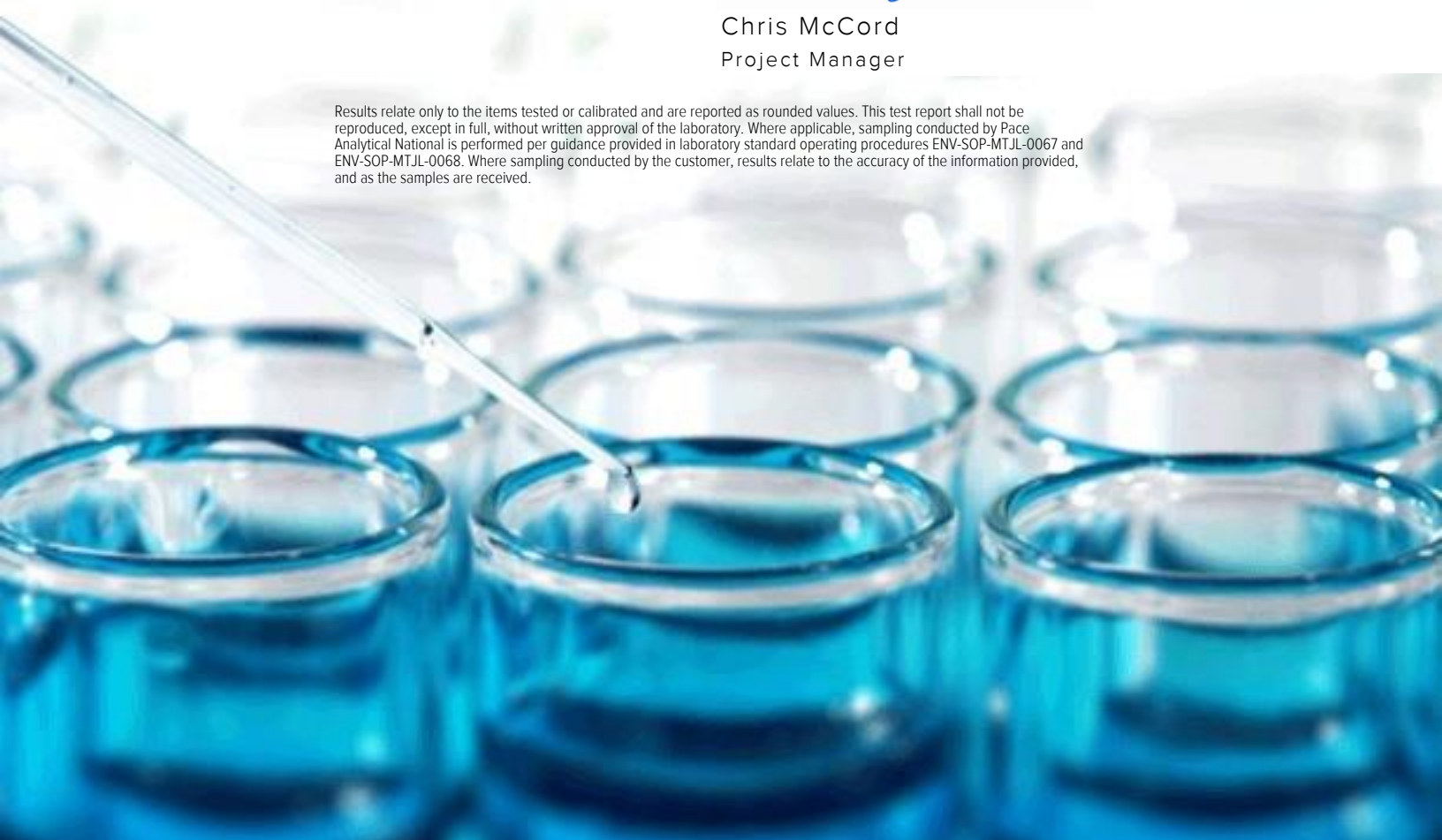
Report To: Doug Seely
1880 West Oak Pkwy.
Bld 100, Suite106
Marietta, GA 30062

Entire Report Reviewed By:



Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.





Cp: Cover Page	1
Tc: Table of Contents	2
Ss: Sample Summary	3
Cn: Case Narrative	4
Sr: Sample Results	5
WC-8 L1231761-01	5
WC-39 L1231761-02	6
WC-41 L1231761-03	7
WC-44 L1231761-04	8
EB-1 L1231761-05	9
WC-11 L1231761-06	10
DUP-01 L1231761-07	11
WC-26 L1231761-08	12
Qc: Quality Control Summary	13
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	13
Gl: Glossary of Terms	17
Al: Accreditations & Locations	18
Sc: Sample Chain of Custody	19



SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WC-8 L1231761-01 GW

				Collected by Kimberly B	Collected date/time 06/15/20 11:31	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 20:16	SHG	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

WC-39 L1231761-02 GW

				Collected by Kimberly B	Collected date/time 06/15/20 12:21	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 20:38	SHG	Mt. Juliet, TN

⁴ Cn

⁵ Sr

WC-41 L1231761-03 GW

				Collected by Kimberly B	Collected date/time 06/15/20 13:24	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 21:00	SHG	Mt. Juliet, TN

⁶ Qc

⁷ Gl

WC-44 L1231761-04 GW

				Collected by Kimberly B	Collected date/time 06/15/20 14:23	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 21:22	SHG	Mt. Juliet, TN

⁸ Al

⁹ Sc

EB-1 L1231761-05 GW

				Collected by Kimberly B	Collected date/time 06/15/20 13:45	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 22:27	SHG	Mt. Juliet, TN

WC-11 L1231761-06 GW

				Collected by Kimberly B	Collected date/time 06/15/20 15:29	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 22:49	SHG	Mt. Juliet, TN

DUP-01 L1231761-07 GW

				Collected by Kimberly B	Collected date/time 06/15/20 15:32	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496409	1	06/21/20 10:42	06/21/20 23:10	SHG	Mt. Juliet, TN

WC-26 L1231761-08 GW

				Collected by Kimberly B	Collected date/time 06/16/20 07:39	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1.25	06/23/20 06:45	06/23/20 16:55	AO	Mt. Juliet, TN

ACCOUNT:

EarthCon Consultants, Inc - Marietta, GA

PROJECT:

02.20000006.20

SDG:

L1231761

DATE/TIME:

06/26/20 14:04

PAGE:

3 of 19



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Project Manager

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 20:16	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 20:16	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 20:16	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 20:16	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 20:16	WG1496409
(S) 2-Fluorophenol	46.8		10.0-120		06/21/2020 20:16	WG1496409
(S) Phenol-d5	30.0		10.0-120		06/21/2020 20:16	WG1496409
(S) Nitrobenzene-d5	57.3		10.0-127		06/21/2020 20:16	WG1496409
(S) 2-Fluorobiphenyl	64.2		10.0-130		06/21/2020 20:16	WG1496409
(S) 2,4,6-Tribromophenol	56.0		10.0-155		06/21/2020 20:16	WG1496409
(S) p-Terphenyl-d14	70.7		10.0-128		06/21/2020 20:16	WG1496409

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 20:38	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 20:38	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 20:38	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 20:38	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 20:38	WG1496409
(S) 2-Fluorophenol	48.4		10.0-120		06/21/2020 20:38	WG1496409
(S) Phenol-d5	30.0		10.0-120		06/21/2020 20:38	WG1496409
(S) Nitrobenzene-d5	58.6		10.0-127		06/21/2020 20:38	WG1496409
(S) 2-Fluorobiphenyl	64.6		10.0-130		06/21/2020 20:38	WG1496409
(S) 2,4,6-Tribromophenol	55.5		10.0-155		06/21/2020 20:38	WG1496409
(S) p-Terphenyl-d14	70.5		10.0-128		06/21/2020 20:38	WG1496409

1
Cp2
Tc3
Ss4
Cn5
Sr6
Qc7
Gl8
Al9
Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 21:00	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 21:00	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 21:00	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 21:00	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 21:00	WG1496409
(S) 2-Fluorophenol	47.7		10.0-120		06/21/2020 21:00	WG1496409
(S) Phenol-d5	30.6		10.0-120		06/21/2020 21:00	WG1496409
(S) Nitrobenzene-d5	55.6		10.0-127		06/21/2020 21:00	WG1496409
(S) 2-Fluorobiphenyl	63.5		10.0-130		06/21/2020 21:00	WG1496409
(S) 2,4,6-Tribromophenol	53.4		10.0-155		06/21/2020 21:00	WG1496409
(S) p-Terphenyl-d14	64.3		10.0-128		06/21/2020 21:00	WG1496409

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 21:22	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 21:22	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 21:22	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 21:22	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 21:22	WG1496409
(S) 2-Fluorophenol	44.6		10.0-120		06/21/2020 21:22	WG1496409
(S) Phenol-d5	27.4		10.0-120		06/21/2020 21:22	WG1496409
(S) Nitrobenzene-d5	53.6		10.0-127		06/21/2020 21:22	WG1496409
(S) 2-Fluorobiphenyl	60.8		10.0-130		06/21/2020 21:22	WG1496409
(S) 2,4,6-Tribromophenol	51.6		10.0-155		06/21/2020 21:22	WG1496409
(S) p-Terphenyl-d14	66.6		10.0-128		06/21/2020 21:22	WG1496409

1
Cp2
Tc3
Ss4
Cn5
Sr6
Qc7
Gl8
Al9
Sc



Collected date/time: 06/15/20 13:45

L1231761

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 22:27	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 22:27	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 22:27	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 22:27	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 22:27	WG1496409
(S) 2-Fluorophenol	48.6		10.0-120		06/21/2020 22:27	WG1496409
(S) Phenol-d5	30.9		10.0-120		06/21/2020 22:27	WG1496409
(S) Nitrobenzene-d5	57.7		10.0-127		06/21/2020 22:27	WG1496409
(S) 2-Fluorobiphenyl	62.0		10.0-130		06/21/2020 22:27	WG1496409
(S) 2,4,6-Tribromophenol	56.3		10.0-155		06/21/2020 22:27	WG1496409
(S) p-Terphenyl-d14	69.3		10.0-128		06/21/2020 22:27	WG1496409

1
Cp2
Tc3
Ss4
Cn5
Sr6
Qc7
Gl8
Al9
Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 22:49	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 22:49	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 22:49	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 22:49	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 22:49	WG1496409
(S) 2-Fluorophenol	48.1		10.0-120		06/21/2020 22:49	WG1496409
(S) Phenol-d5	30.2		10.0-120		06/21/2020 22:49	WG1496409
(S) Nitrobenzene-d5	56.3		10.0-127		06/21/2020 22:49	WG1496409
(S) 2-Fluorobiphenyl	58.5		10.0-130		06/21/2020 22:49	WG1496409
(S) 2,4,6-Tribromophenol	54.6		10.0-155		06/21/2020 22:49	WG1496409
(S) p-Terphenyl-d14	57.3		10.0-128		06/21/2020 22:49	WG1496409

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.00	1	06/21/2020 23:10	WG1496409
Naphthalene	ND		1.00	1	06/21/2020 23:10	WG1496409
Phenanthrene	ND		1.00	1	06/21/2020 23:10	WG1496409
3&4-methyl phenol	ND		10.0	1	06/21/2020 23:10	WG1496409
Pentachlorophenol	ND		1.00	1	06/21/2020 23:10	WG1496409
(S) 2-Fluorophenol	46.9		10.0-120		06/21/2020 23:10	WG1496409
(S) Phenol-d5	28.8		10.0-120		06/21/2020 23:10	WG1496409
(S) Nitrobenzene-d5	53.2		10.0-127		06/21/2020 23:10	WG1496409
(S) 2-Fluorobiphenyl	57.0		10.0-130		06/21/2020 23:10	WG1496409
(S) 2,4,6-Tribromophenol	52.5		10.0-155		06/21/2020 23:10	WG1496409
(S) p-Terphenyl-d14	55.8		10.0-128		06/21/2020 23:10	WG1496409

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Collected date/time: 06/16/20 07:39

L1231761

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result ug/l	Qualifier	RDL ug/l	Dilution	Analysis date / time	Batch
Fluorene	ND		1.25	1.25	06/23/2020 16:55	WG1496709
Naphthalene	ND		1.25	1.25	06/23/2020 16:55	WG1496709
Phenanthrene	ND		1.25	1.25	06/23/2020 16:55	WG1496709
3&4-methyl phenol	ND		12.5	1.25	06/23/2020 16:55	WG1496709
Pentachlorophenol	1.45		1.25	1.25	06/23/2020 16:55	WG1496709
(S) 2-Fluorophenol	45.6		10.0-120		06/23/2020 16:55	WG1496709
(S) Phenol-d5	28.9		10.0-120		06/23/2020 16:55	WG1496709
(S) Nitrobenzene-d5	64.1		10.0-127		06/23/2020 16:55	WG1496709
(S) 2-Fluorobiphenyl	67.6		10.0-130		06/23/2020 16:55	WG1496709
(S) 2,4,6-Tribromophenol	83.2		10.0-155		06/23/2020 16:55	WG1496709
(S) p-Terphenyl-d14	81.6		10.0-128		06/23/2020 16:55	WG1496709

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Method Blank (MB)

(MB) R3541581-2 06/21/20 16:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Fluorene	U		0.0844	1.00
Naphthalene	U		0.159	1.00
Phenanthrene	U		0.112	1.00
3&4-Methyl Phenol	U		0.168	10.0
Pentachlorophenol	U		0.313	1.00
(S) Nitrobenzene-d5	56.5			10.0-127
(S) 2-Fluorobiphenyl	64.1			10.0-130
(S) p-Terphenyl-d14	70.3			10.0-128
(S) Phenol-d5	28.1			10.0-120
(S) 2-Fluorophenol	45.0			10.0-120
(S) 2,4,6-Tribromophenol	56.5			10.0-155

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS)

(LCS) R3541581-1 06/21/20 16:15

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Fluorene	50.0	31.2	62.4	47.0-120	
Naphthalene	50.0	28.1	56.2	27.0-120	
Phenanthrene	50.0	32.1	64.2	46.0-120	
3&4-Methyl Phenol	50.0	29.9	59.8	31.0-120	
Pentachlorophenol	50.0	29.4	58.8	23.0-120	
(S) Nitrobenzene-d5			44.7	10.0-127	
(S) 2-Fluorobiphenyl			64.1	10.0-130	
(S) p-Terphenyl-d14			70.1	10.0-128	
(S) Phenol-d5			28.7	10.0-120	
(S) 2-Fluorophenol			45.2	10.0-120	
(S) 2,4,6-Tribromophenol			60.5	10.0-155	

L1231761-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231761-04 06/21/20 21:22 • (MS) R3541581-3 06/21/20 21:44 • (MSD) R3541581-4 06/21/20 22:05

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Fluorene	45.5	ND	29.7	28.4	65.3	62.4	1	37.0-120			4.48	24
Naphthalene	45.5	ND	25.6	26.0	56.3	57.1	1	10.0-120			1.55	31
Phenanthrene	45.5	ND	29.0	29.4	63.7	64.6	1	33.0-120			1.37	22
3&4-Methyl Phenol	45.5	ND	29.1	27.2	64.0	59.8	1	10.0-120			6.75	36
Pentachlorophenol	45.5	ND	25.9	25.7	56.9	56.5	1	10.0-128			0.775	37

L1231761-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231761-04 06/21/20 21:22 • (MS) R3541581-3 06/21/20 21:44 • (MSD) R3541581-4 06/21/20 22:05

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
(S) Nitrobenzene-d5					48.6	46.0		10.0-127				
(S) 2-Fluorobiphenyl					61.6	66.2		10.0-130				
(S) p-Terphenyl-d14					63.7	70.5		10.0-128				
(S) Phenol-d5					29.1	28.9		10.0-120				
(S) 2-Fluorophenol					44.1	44.7		10.0-120				
(S) 2,4,6-Tribromophenol					55.5	60.4		10.0-155				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Method Blank (MB)

(MB) R3542249-2 06/23/20 14:06

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	ug/l		ug/l	ug/l
Fluorene	U		0.0844	1.00
Naphthalene	0.349	J	0.159	1.00
Phenanthrene	U		0.112	1.00
3&4-Methyl Phenol	U		0.168	10.0
Pentachlorophenol	U		0.313	1.00
(S) Nitrobenzene-d5	65.6			10.0-127
(S) 2-Fluorobiphenyl	75.5			10.0-130
(S) p-Terphenyl-d14	85.2			10.0-128
(S) Phenol-d5	29.0			10.0-120
(S) 2-Fluorophenol	44.9			10.0-120
(S) 2,4,6-Tribromophenol	83.5			10.0-155

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS)

(LCS) R3542249-1 06/23/20 13:45

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	ug/l	ug/l	%	%	
Fluorene	50.0	39.4	78.8	47.0-120	
Naphthalene	50.0	33.7	67.4	27.0-120	
Phenanthrene	50.0	44.3	88.6	46.0-120	
3&4-Methyl Phenol	50.0	33.0	66.0	31.0-120	
Pentachlorophenol	50.0	40.8	81.6	23.0-120	
(S) Nitrobenzene-d5			61.7	10.0-127	
(S) 2-Fluorobiphenyl			83.1	10.0-130	
(S) p-Terphenyl-d14			89.0	10.0-128	
(S) Phenol-d5			29.5	10.0-120	
(S) 2-Fluorophenol			46.5	10.0-120	
(S) 2,4,6-Tribromophenol			98.5	10.0-155	

L1231742-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231742-06 06/23/20 15:09 • (MS) R3542249-3 06/23/20 15:31 • (MSD) R3542249-4 06/23/20 15:52

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	ug/l	ug/l	ug/l	ug/l	%	%		%			%	%
Fluorene	45.5	3.17	39.1	35.6	79.0	71.3	1	37.0-120			9.37	24
Naphthalene	45.5	4.81	32.8	30.6	61.5	56.7	1	10.0-120			6.94	31
Phenanthrene	45.5	ND	41.1	37.8	88.9	81.7	1	33.0-120			8.37	22
3&4-Methyl Phenol	45.5	ND	29.7	28.7	65.3	63.1	1	10.0-120			3.42	36
Pentachlorophenol	45.5	ND	38.0	35.3	83.5	77.6	1	10.0-128			7.37	37

L1231742-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231742-06 06/23/20 15:09 • (MS) R3542249-3 06/23/20 15:31 • (MSD) R3542249-4 06/23/20 15:52

Analyte	Spike Amount ug/l	Original Result ug/l	MS Result ug/l	MSD Result ug/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
(S) Nitrobenzene-d5					60.5	57.9		10.0-127				
(S) 2-Fluorobiphenyl					76.3	75.4		10.0-130				
(S) p-Terphenyl-d14					88.8	82.4		10.0-128				
(S) Phenol-d5					27.9	28.0		10.0-120				
(S) 2-Fluorophenol					44.0	43.8		10.0-120				
(S) 2,4,6-Tribromophenol					94.5	91.2		10.0-155				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

J	The identification of the analyte is acceptable; the reported value is an estimate.
---	---

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



EarthCon Consultants, Inc - Marietta, GA 1880 West Oak Pkwy.				Billing Information: Accounts Payable 1880 West Oak Pkwy, Bld 100, Suite106 Marietta, GA 30062				Pres Chk		Analysis / Container / Preservative										Chain of Custody Page <u>1</u> of <u>1</u>	
				Report to: Doug Seely				Email To: dseely@earthcon.com; dadkins@earthcon.com													
Project Description: IP Wiggins				City/State Collected: Wiggins, MS		Please Circle: PT MT CT ET															
Phone: 770-973-2100		Client Project # 08-2000006-20		Lab Project # PREMOMGA-WIGGINS		8270PCP 100ml Amb NoPres															
Collected by (print): Kimberly Barfield		Site/Facility ID #		P.O. #																	
Collected by (signature): Kimberly Barfield		Rush? (Lab MUST Be Notified) <input type="checkbox"/> Same Day <input type="checkbox"/> Five Day <input type="checkbox"/> Next Day <input type="checkbox"/> 5 Day (Rad Only) <input type="checkbox"/> Two Day <input type="checkbox"/> 10 Day (Rad Only) <input type="checkbox"/> Three Day		Quote #																	
Immediately Packed on Ice N <input type="checkbox"/> Y <input checked="" type="checkbox"/>																					
Sample ID		Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs														
WC-8		Grab	GW		6-15-2020	11:31	2	<input checked="" type="checkbox"/>													
WC-39			GW			12:21	2	<input checked="" type="checkbox"/>													
WC-41			GW			13:24	2	<input checked="" type="checkbox"/>													
WC-44			GW			14:23	2	<input checked="" type="checkbox"/>													
EB-1			GW			13:45	2	<input checked="" type="checkbox"/>													
WC-44 MS/mSP			GW			14:26	2	<input checked="" type="checkbox"/>													
WC-11			GW			15:29	2	<input checked="" type="checkbox"/>													
PUP-01			GW		↓	15:32	2	<input checked="" type="checkbox"/>													
WC-26		↓	GW		6-16-2020	07:39	2	<input checked="" type="checkbox"/>													
			GW				2	<input checked="" type="checkbox"/>													
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other _____		Remarks: 8270PCP = 3&4-methylphenol, fluorene, naphthalene, pentachlorophenol and phenanthrene.										pH _____ Temp _____ Flow _____ Other _____		Sample Receipt Checklist COC Seal Present/Intact: <input type="checkbox"/> NP <input checked="" type="checkbox"/> Y <input type="checkbox"/> N COC Signed/Accurate: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Bottles arrive intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Correct bottles used: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Sufficient volume sent: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N If Applicable VOA Zero Headspace: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N Preservation Correct/Checked: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N RAD Screen <0.5 mR/hr: <input type="checkbox"/> Y <input checked="" type="checkbox"/> N							
Samples returned via: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> Courier				Tracking # 17903033 3135																	
Relinquished by: (Signature) Kimberly Barfield		Date: 6/18/2020	Time: 17:00	Received by: (Signature)		Trip Blank Received: Yes / No HCL / MeOH TBR															
Relinquished by: (Signature)		Date:	Time:	Received by: (Signature)		Temp: 11.1 °C Bottles Received: 18 3.1 ± 0.3.1		If preservation required by Login: Date/Time													
Relinquished by: (Signature)		Date:	Time:	Received for lab by: (Signature) DeCaro		Date: 6/20/20 Time: 8:45		Hold:		Condition: NCF / OK											

June 29, 2020

EarthCon Consultants, Inc - Marietta, GA

Sample Delivery Group: L1231742
Samples Received: 06/20/2020
Project Number: 02.20000006.20
Description: IP Wiggins

Report To: Doug Seely
1880 West Oak Pkwy.
Bld 100, Suite106
Marietta, GA 30062

Entire Report Reviewed By:



Chris McCord
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Cp: Cover Page	1	¹ Cp
Tc: Table of Contents	2	
Ss: Sample Summary	3	² Tc
Cn: Case Narrative	5	
Sr: Sample Results	6	³ Ss
WP-1 L1231742-01	6	
WP-2 L1231742-02	7	⁴ Cn
DUP-02 L1231742-03	8	⁵ Sr
WC-8A L1231742-04	9	
WC-43 L1231742-05	10	⁶ Qc
WCP-8 L1231742-06	11	
EB-2 L1231742-07	12	⁷ Gl
WC-56 L1231742-08	13	⁸ Al
DUP-03 L1231742-09	14	
WC-57 L1231742-10	15	⁹ Sc
DUP-04 L1231742-11	16	
Qc: Quality Control Summary	17	
Volatile Organic Compounds (GC/MS) by Method 8260B	17	
Semi Volatile Organic Compounds (GC/MS) by Method 8270 C-SIM	18	
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	20	
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	23	
Gl: Glossary of Terms	30	
Al: Accreditations & Locations	31	
Sc: Sample Chain of Custody	32	

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



WP-1 L1231742-01 GW

				Collected by Kimberly B	Collected date/time 06/17/20 10:30	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 14:10	06/24/20 14:10	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 17:58	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497092	1	06/23/20 18:36	06/24/20 05:10	DMG	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

WP-2 L1231742-02 GW

				Collected by Kimberly B	Collected date/time 06/17/20 16:28	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 14:34	06/24/20 14:34	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 18:18	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497092	1	06/23/20 18:36	06/24/20 05:30	DMG	Mt. Juliet, TN

⁴ Cn

⁵ Sr

⁶ Qc

DUP-02 L1231742-03 GW

				Collected by Kimberly B	Collected date/time 06/17/20 16:35	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 14:58	06/24/20 14:58	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 18:39	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497093	1	06/23/20 06:21	06/23/20 15:03	LEA	Mt. Juliet, TN

⁷ Gl

⁸ Al

⁹ Sc

WC-8A L1231742-04 GW

				Collected by Kimberly B	Collected date/time 06/17/20 15:26	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 15:22	06/24/20 15:22	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 14:27	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497093	1	06/23/20 06:21	06/23/20 15:23	LEA	Mt. Juliet, TN

WC-43 L1231742-05 GW

				Collected by Kimberly B	Collected date/time 06/17/20 11:20	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 15:46	06/24/20 15:46	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 14:48	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497093	1	06/23/20 06:21	06/23/20 15:44	LEA	Mt. Juliet, TN

WCP-8 L1231742-06 GW

				Collected by Kimberly B	Collected date/time 06/17/20 12:07	Received date/time 06/20/20 08:45
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 16:10	06/24/20 16:10	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 15:09	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497657	1	06/23/20 21:37	06/24/20 09:58	DMG	Mt. Juliet, TN

ACCOUNT:

EarthCon Consultants, Inc - Marietta, GA

PROJECT:

02.20000006.20

SDG:

L1231742

DATE/TIME:

06/29/20 11:52

PAGE:

3 of 33

SAMPLE SUMMARY

ONE LAB. NATIONWIDE.



EB-2 L1231742-07 GW

Collected by
Kimberly B

Collected date/time
06/17/20 11:43

Received date/time
06/20/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 13:47	06/24/20 13:47	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 16:13	AO	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497093	1	06/23/20 06:21	06/23/20 16:04	LEA	Mt. Juliet, TN

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

WC-56 L1231742-08 GW

Collected by
Kimberly B

Collected date/time
06/18/20 08:44

Received date/time
06/20/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 16:34	06/24/20 16:34	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270 C-SIM	WG1497672	1	06/25/20 20:19	06/26/20 00:12	AAT	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1496709	1	06/23/20 06:45	06/23/20 16:34	AO	Mt. Juliet, TN

DUP-03 L1231742-09 GW

Collected by
Kimberly B

Collected date/time
06/18/20 08:47

Received date/time
06/20/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 16:58	06/24/20 16:58	BMB	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1497670	1	06/24/20 15:18	06/25/20 17:24	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1497880	1	06/24/20 13:19	06/25/20 08:32	DMG	Mt. Juliet, TN

WC-57 L1231742-10 GW

Collected by
Kimberly B

Collected date/time
06/18/20 09:20

Received date/time
06/20/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 17:22	06/24/20 17:22	ACG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1497670	1	06/24/20 15:18	06/25/20 17:45	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1498394	1	06/24/20 18:49	06/25/20 18:41	DMG	Mt. Juliet, TN

DUP-04 L1231742-11 GW

Collected by
Kimberly B

Collected date/time
06/18/20 09:25

Received date/time
06/20/20 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1498313	1	06/24/20 17:45	06/24/20 17:45	ACG	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C	WG1497670	1	06/24/20 15:18	06/25/20 18:05	JNJ	Mt. Juliet, TN
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG1498394	1	06/24/20 18:49	06/25/20 19:05	DMG	Mt. Juliet, TN

ACCOUNT:

EarthCon Consultants, Inc - Marietta, GA

PROJECT:

02.20000006.20

SDG:

L1231742

DATE/TIME:

06/29/20 11:52

PAGE:

4 of 33



All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Chris McCord
Project Manager

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 14:10	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 14:10	WG1498313
(S) Toluene-d8	109			80.0-120		06/24/2020 14:10	WG1498313
(S) 4-Bromofluorobenzene	108			77.0-126		06/24/2020 14:10	WG1498313
(S) 1,2-Dichloroethane-d4	119			70.0-130		06/24/2020 14:10	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	0.000112	J	0.000111	0.0100	1	06/23/2020 17:58	WG1496709
Dibenzofuran	0.000252	J	0.0000970	0.0100	1	06/23/2020 17:58	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 17:58	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 17:58	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 17:58	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 17:58	WG1496709
Phenol	0.00487	J	0.00433	0.0100	1	06/23/2020 17:58	WG1496709
Pentachlorophenol	0.00182		0.000313	0.00100	1	06/23/2020 17:58	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 17:58	WG1496709
2,3,4,6-Tetrachlorophenol	0.000391	J	0.000231	0.0100	1	06/23/2020 17:58	WG1496709
(S) 2-Fluorophenol	46.4			10.0-120		06/23/2020 17:58	WG1496709
(S) Phenol-d5	29.4			10.0-120		06/23/2020 17:58	WG1496709
(S) Nitrobenzene-d5	68.4			10.0-127		06/23/2020 17:58	WG1496709
(S) 2-Fluorobiphenyl	77.1			10.0-130		06/23/2020 17:58	WG1496709
(S) 2,4,6-Tribromophenol	95.1			10.0-155		06/23/2020 17:58	WG1496709
(S) p-Terphenyl-d14	91.0			10.0-128		06/23/2020 17:58	WG1496709

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/24/2020 05:10	WG1497092
Acenaphthene	0.0000354	J	0.0000190	0.0000500	1	06/24/2020 05:10	WG1497092
Acenaphthylene	U		0.0000171	0.0000500	1	06/24/2020 05:10	WG1497092
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/24/2020 05:10	WG1497092
Benzo(k)fluoranthene	0.0000330	J	0.0000202	0.0000500	1	06/24/2020 05:10	WG1497092
Chrysene	U		0.0000179	0.0000500	1	06/24/2020 05:10	WG1497092
Fluoranthene	U		0.0000270	0.000100	1	06/24/2020 05:10	WG1497092
Fluorene	0.0000337	J	0.0000169	0.0000500	1	06/24/2020 05:10	WG1497092
Naphthalene	0.00248		0.0000917	0.000250	1	06/24/2020 05:10	WG1497092
Phenanthrene	0.0000286	J	0.0000180	0.0000500	1	06/24/2020 05:10	WG1497092
Pyrene	0.0000209	J	0.0000169	0.0000500	1	06/24/2020 05:10	WG1497092
2-Methylnaphthalene	0.000100	J	0.0000674	0.000250	1	06/24/2020 05:10	WG1497092
(S) Nitrobenzene-d5	55.8			31.0-160		06/24/2020 05:10	WG1497092
(S) 2-Fluorobiphenyl	22.7	J2		48.0-148		06/24/2020 05:10	WG1497092
(S) p-Terphenyl-d14	17.0	J2		37.0-146		06/24/2020 05:10	WG1497092



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 14:34	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 14:34	WG1498313
(S) Toluene-d8	109			80.0-120		06/24/2020 14:34	WG1498313
(S) 4-Bromofluorobenzene	104			77.0-126		06/24/2020 14:34	WG1498313
(S) 1,2-Dichloroethane-d4	118			70.0-130		06/24/2020 14:34	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/23/2020 18:18	WG1496709
Dibenzofuran	U		0.0000970	0.0100	1	06/23/2020 18:18	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 18:18	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 18:18	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 18:18	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 18:18	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 18:18	WG1496709
Pentachlorophenol	U		0.000313	0.00100	1	06/23/2020 18:18	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 18:18	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 18:18	WG1496709
(S) 2-Fluorophenol	42.6			10.0-120		06/23/2020 18:18	WG1496709
(S) Phenol-d5	26.3			10.0-120		06/23/2020 18:18	WG1496709
(S) Nitrobenzene-d5	60.1			10.0-127		06/23/2020 18:18	WG1496709
(S) 2-Fluorobiphenyl	64.4			10.0-130		06/23/2020 18:18	WG1496709
(S) 2,4,6-Tribromophenol	79.7			10.0-155		06/23/2020 18:18	WG1496709
(S) p-Terphenyl-d14	75.6			10.0-128		06/23/2020 18:18	WG1496709

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/24/2020 05:30	WG1497092
Acenaphthene	U		0.0000190	0.0000500	1	06/24/2020 05:30	WG1497092
Acenaphthylene	U		0.0000171	0.0000500	1	06/24/2020 05:30	WG1497092
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/24/2020 05:30	WG1497092
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/24/2020 05:30	WG1497092
Chrysene	U		0.0000179	0.0000500	1	06/24/2020 05:30	WG1497092
Fluoranthene	U		0.0000270	0.000100	1	06/24/2020 05:30	WG1497092
Fluorene	U		0.0000169	0.0000500	1	06/24/2020 05:30	WG1497092
Naphthalene	U		0.0000917	0.000250	1	06/24/2020 05:30	WG1497092
Phenanthrene	U		0.0000180	0.0000500	1	06/24/2020 05:30	WG1497092
Pyrene	U		0.0000169	0.0000500	1	06/24/2020 05:30	WG1497092
2-Methylnaphthalene	U		0.0000674	0.000250	1	06/24/2020 05:30	WG1497092
(S) Nitrobenzene-d5	103			31.0-160		06/24/2020 05:30	WG1497092
(S) 2-Fluorobiphenyl	92.6			48.0-148		06/24/2020 05:30	WG1497092
(S) p-Terphenyl-d14	99.5			37.0-146		06/24/2020 05:30	WG1497092



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 14:58	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 14:58	WG1498313
(S) Toluene-d8	106			80.0-120		06/24/2020 14:58	WG1498313
(S) 4-Bromofluorobenzene	99.4			77.0-126		06/24/2020 14:58	WG1498313
(S) 1,2-Dichloroethane-d4	123			70.0-130		06/24/2020 14:58	WG1498313

¹ Cp² Tc³ Ss⁴ Cn⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/23/2020 18:39	WG1496709
Dibenzofuran	U		0.0000970	0.0100	1	06/23/2020 18:39	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 18:39	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 18:39	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 18:39	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 18:39	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 18:39	WG1496709
Pentachlorophenol	U		0.000313	0.00100	1	06/23/2020 18:39	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 18:39	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 18:39	WG1496709
(S) 2-Fluorophenol	45.5			10.0-120		06/23/2020 18:39	WG1496709
(S) Phenol-d5	28.0			10.0-120		06/23/2020 18:39	WG1496709
(S) Nitrobenzene-d5	66.2			10.0-127		06/23/2020 18:39	WG1496709
(S) 2-Fluorobiphenyl	70.3			10.0-130		06/23/2020 18:39	WG1496709
(S) 2,4,6-Tribromophenol	84.1			10.0-155		06/23/2020 18:39	WG1496709
(S) p-Terphenyl-d14	84.2			10.0-128		06/23/2020 18:39	WG1496709

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/23/2020 15:03	WG1497093
Acenaphthene	U		0.0000190	0.0000500	1	06/23/2020 15:03	WG1497093
Acenaphthylene	U		0.0000171	0.0000500	1	06/23/2020 15:03	WG1497093
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/23/2020 15:03	WG1497093
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/23/2020 15:03	WG1497093
Chrysene	U		0.0000179	0.0000500	1	06/23/2020 15:03	WG1497093
Fluoranthene	U		0.0000270	0.000100	1	06/23/2020 15:03	WG1497093
Fluorene	U		0.0000169	0.0000500	1	06/23/2020 15:03	WG1497093
Naphthalene	U		0.0000917	0.000250	1	06/23/2020 15:03	WG1497093
Phenanthrene	U		0.0000180	0.0000500	1	06/23/2020 15:03	WG1497093
Pyrene	U		0.0000169	0.0000500	1	06/23/2020 15:03	WG1497093
2-Methylnaphthalene	U		0.0000674	0.000250	1	06/23/2020 15:03	WG1497093
(S) Nitrobenzene-d5	97.4			31.0-160		06/23/2020 15:03	WG1497093
(S) 2-Fluorobiphenyl	86.3			48.0-148		06/23/2020 15:03	WG1497093
(S) p-Terphenyl-d14	88.9			37.0-146		06/23/2020 15:03	WG1497093



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 15:22	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 15:22	WG1498313
(S) Toluene-d8	109			80.0-120		06/24/2020 15:22	WG1498313
(S) 4-Bromofluorobenzene	110			77.0-126		06/24/2020 15:22	WG1498313
(S) 1,2-Dichloroethane-d4	120			70.0-130		06/24/2020 15:22	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/23/2020 14:27	WG1496709
Dibenzofuran	U		0.0000970	0.0100	1	06/23/2020 14:27	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 14:27	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 14:27	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 14:27	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 14:27	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 14:27	WG1496709
Pentachlorophenol	0.000889	J	0.000313	0.00100	1	06/23/2020 14:27	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 14:27	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 14:27	WG1496709
(S) 2-Fluorophenol	47.3			10.0-120		06/23/2020 14:27	WG1496709
(S) Phenol-d5	29.3			10.0-120		06/23/2020 14:27	WG1496709
(S) Nitrobenzene-d5	69.7			10.0-127		06/23/2020 14:27	WG1496709
(S) 2-Fluorobiphenyl	76.3			10.0-130		06/23/2020 14:27	WG1496709
(S) 2,4,6-Tribromophenol	90.1			10.0-155		06/23/2020 14:27	WG1496709
(S) p-Terphenyl-d14	90.8			10.0-128		06/23/2020 14:27	WG1496709

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/23/2020 15:23	WG1497093
Acenaphthene	U		0.0000190	0.0000500	1	06/23/2020 15:23	WG1497093
Acenaphthylene	U		0.0000171	0.0000500	1	06/23/2020 15:23	WG1497093
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/23/2020 15:23	WG1497093
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/23/2020 15:23	WG1497093
Chrysene	U		0.0000179	0.0000500	1	06/23/2020 15:23	WG1497093
Fluoranthene	U		0.0000270	0.000100	1	06/23/2020 15:23	WG1497093
Fluorene	U		0.0000169	0.0000500	1	06/23/2020 15:23	WG1497093
Naphthalene	U		0.0000917	0.000250	1	06/23/2020 15:23	WG1497093
Phenanthrene	0.0000183	J	0.0000180	0.0000500	1	06/23/2020 15:23	WG1497093
Pyrene	U		0.0000169	0.0000500	1	06/23/2020 15:23	WG1497093
2-Methylnaphthalene	U		0.0000674	0.000250	1	06/23/2020 15:23	WG1497093
(S) Nitrobenzene-d5	97.4			31.0-160		06/23/2020 15:23	WG1497093
(S) 2-Fluorobiphenyl	88.4			48.0-148		06/23/2020 15:23	WG1497093
(S) p-Terphenyl-d14	88.4			37.0-146		06/23/2020 15:23	WG1497093



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 15:46	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 15:46	WG1498313
(S) Toluene-d8	106			80.0-120		06/24/2020 15:46	WG1498313
(S) 4-Bromofluorobenzene	101			77.0-126		06/24/2020 15:46	WG1498313
(S) 1,2-Dichloroethane-d4	123			70.0-130		06/24/2020 15:46	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/23/2020 14:48	WG1496709
Dibenzofuran	U		0.0000970	0.0100	1	06/23/2020 14:48	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 14:48	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 14:48	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 14:48	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 14:48	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 14:48	WG1496709
Pentachlorophenol	U		0.000313	0.00100	1	06/23/2020 14:48	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 14:48	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 14:48	WG1496709
(S) 2-Fluorophenol	50.2			10.0-120		06/23/2020 14:48	WG1496709
(S) Phenol-d5	30.7			10.0-120		06/23/2020 14:48	WG1496709
(S) Nitrobenzene-d5	73.8			10.0-127		06/23/2020 14:48	WG1496709
(S) 2-Fluorobiphenyl	81.1			10.0-130		06/23/2020 14:48	WG1496709
(S) 2,4,6-Tribromophenol	90.7			10.0-155		06/23/2020 14:48	WG1496709
(S) p-Terphenyl-d14	92.3			10.0-128		06/23/2020 14:48	WG1496709

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/23/2020 15:44	WG1497093
Acenaphthene	U		0.0000190	0.0000500	1	06/23/2020 15:44	WG1497093
Acenaphthylene	U		0.0000171	0.0000500	1	06/23/2020 15:44	WG1497093
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/23/2020 15:44	WG1497093
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/23/2020 15:44	WG1497093
Chrysene	U		0.0000179	0.0000500	1	06/23/2020 15:44	WG1497093
Fluoranthene	U		0.0000270	0.000100	1	06/23/2020 15:44	WG1497093
Fluorene	U		0.0000169	0.0000500	1	06/23/2020 15:44	WG1497093
Naphthalene	U		0.0000917	0.000250	1	06/23/2020 15:44	WG1497093
Phenanthrene	U		0.0000180	0.0000500	1	06/23/2020 15:44	WG1497093
Pyrene	U		0.0000169	0.0000500	1	06/23/2020 15:44	WG1497093
2-Methylnaphthalene	U		0.0000674	0.000250	1	06/23/2020 15:44	WG1497093
(S) Nitrobenzene-d5	118			31.0-160		06/23/2020 15:44	WG1497093
(S) 2-Fluorobiphenyl	101			48.0-148		06/23/2020 15:44	WG1497093
(S) p-Terphenyl-d14	104			37.0-146		06/23/2020 15:44	WG1497093



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 16:10	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 16:10	WG1498313
(S) Toluene-d8	105			80.0-120		06/24/2020 16:10	WG1498313
(S) 4-Bromofluorobenzene	107			77.0-126		06/24/2020 16:10	WG1498313
(S) 1,2-Dichloroethane-d4	126			70.0-130		06/24/2020 16:10	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	0.00503	J	0.000111	0.0100	1	06/23/2020 15:09	WG1496709
Dibenzofuran	0.00164	J	0.0000970	0.0100	1	06/23/2020 15:09	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 15:09	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 15:09	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 15:09	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 15:09	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 15:09	WG1496709
Pentachlorophenol	U		0.000313	0.00100	1	06/23/2020 15:09	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 15:09	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 15:09	WG1496709
(S) 2-Fluorophenol	44.7			10.0-120		06/23/2020 15:09	WG1496709
(S) Phenol-d5	27.7			10.0-120		06/23/2020 15:09	WG1496709
(S) Nitrobenzene-d5	67.0			10.0-127		06/23/2020 15:09	WG1496709
(S) 2-Fluorobiphenyl	73.5			10.0-130		06/23/2020 15:09	WG1496709
(S) 2,4,6-Tribromophenol	87.9			10.0-155		06/23/2020 15:09	WG1496709
(S) p-Terphenyl-d14	84.6			10.0-128		06/23/2020 15:09	WG1496709

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	0.0000325	J	0.0000190	0.0000500	1	06/24/2020 09:58	WG1497657
Acenaphthene	0.000509		0.0000190	0.0000500	1	06/24/2020 09:58	WG1497657
Acenaphthylene	U		0.0000171	0.0000500	1	06/24/2020 09:58	WG1497657
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/24/2020 09:58	WG1497657
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/24/2020 09:58	WG1497657
Chrysene	U		0.0000179	0.0000500	1	06/24/2020 09:58	WG1497657
Fluoranthene	0.0000280	J	0.0000270	0.000100	1	06/24/2020 09:58	WG1497657
Fluorene	0.00440		0.0000169	0.0000500	1	06/24/2020 09:58	WG1497657
Naphthalene	0.00609		0.0000917	0.000250	1	06/24/2020 09:58	WG1497657
Phenanthrene	0.000937		0.0000180	0.0000500	1	06/24/2020 09:58	WG1497657
Pyrene	U		0.0000169	0.0000500	1	06/24/2020 09:58	WG1497657
2-Methylnaphthalene	0.00138		0.0000674	0.000250	1	06/24/2020 09:58	WG1497657
(S) Nitrobenzene-d5	104			31.0-160		06/24/2020 09:58	WG1497657
(S) 2-Fluorobiphenyl	97.4			48.0-148		06/24/2020 09:58	WG1497657
(S) p-Terphenyl-d14	101			37.0-146		06/24/2020 09:58	WG1497657



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 13:47	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 13:47	WG1498313
(S) Toluene-d8	109			80.0-120		06/24/2020 13:47	WG1498313
(S) 4-Bromofluorobenzene	103			77.0-126		06/24/2020 13:47	WG1498313
(S) 1,2-Dichloroethane-d4	123			70.0-130		06/24/2020 13:47	WG1498313

¹ Cp² Tc³ Ss⁴ Cn

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/23/2020 16:13	WG1496709
Dibenzofuran	U		0.0000970	0.0100	1	06/23/2020 16:13	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 16:13	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 16:13	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 16:13	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 16:13	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 16:13	WG1496709
Pentachlorophenol	0.00182		0.000313	0.00100	1	06/23/2020 16:13	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 16:13	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 16:13	WG1496709
(S) 2-Fluorophenol	47.4			10.0-120		06/23/2020 16:13	WG1496709
(S) Phenol-d5	29.7			10.0-120		06/23/2020 16:13	WG1496709
(S) Nitrobenzene-d5	68.8			10.0-127		06/23/2020 16:13	WG1496709
(S) 2-Fluorobiphenyl	74.9			10.0-130		06/23/2020 16:13	WG1496709
(S) 2,4,6-Tribromophenol	90.7			10.0-155		06/23/2020 16:13	WG1496709
(S) p-Terphenyl-d14	91.5			10.0-128		06/23/2020 16:13	WG1496709

⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/23/2020 16:04	WG1497093
Acenaphthene	U		0.0000190	0.0000500	1	06/23/2020 16:04	WG1497093
Acenaphthylene	U		0.0000171	0.0000500	1	06/23/2020 16:04	WG1497093
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/23/2020 16:04	WG1497093
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/23/2020 16:04	WG1497093
Chrysene	U		0.0000179	0.0000500	1	06/23/2020 16:04	WG1497093
Fluoranthene	U		0.0000270	0.000100	1	06/23/2020 16:04	WG1497093
Fluorene	U		0.0000169	0.0000500	1	06/23/2020 16:04	WG1497093
Naphthalene	U		0.0000917	0.000250	1	06/23/2020 16:04	WG1497093
Phenanthrene	U		0.0000180	0.0000500	1	06/23/2020 16:04	WG1497093
Pyrene	U		0.0000169	0.0000500	1	06/23/2020 16:04	WG1497093
2-Methylnaphthalene	U		0.0000674	0.000250	1	06/23/2020 16:04	WG1497093
(S) Nitrobenzene-d5	101			31.0-160		06/23/2020 16:04	WG1497093
(S) 2-Fluorobiphenyl	91.6			48.0-148		06/23/2020 16:04	WG1497093
(S) p-Terphenyl-d14	94.7			37.0-146		06/23/2020 16:04	WG1497093



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 16:34	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 16:34	WG1498313
(S) Toluene-d8	107			80.0-120		06/24/2020 16:34	WG1498313
(S) 4-Bromofluorobenzene	106			77.0-126		06/24/2020 16:34	WG1498313
(S) 1,2-Dichloroethane-d4	125			70.0-130		06/24/2020 16:34	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270 C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/26/2020 00:12	WG1497672
Acenaphthene	U		0.0000190	0.0000500	1	06/26/2020 00:12	WG1497672
Acenaphthylene	U		0.0000170	0.0000500	1	06/26/2020 00:12	WG1497672
Benzo(b)fluoranthene	U		0.0000170	0.0000500	1	06/26/2020 00:12	WG1497672
Benzo(k)fluoranthene	U		0.0000200	0.000250	1	06/26/2020 00:12	WG1497672
Chrysene	U		0.0000180	0.0000500	1	06/26/2020 00:12	WG1497672
Fluoranthene	0.0000213	J	0.0000110	0.0000500	1	06/26/2020 00:12	WG1497672
Fluorene	U		0.0000170	0.0000500	1	06/26/2020 00:12	WG1497672
Naphthalene	U		0.000128	0.000500	1	06/26/2020 00:12	WG1497672
Phenanthrene	0.0000184	J	0.0000180	0.0000500	1	06/26/2020 00:12	WG1497672
Pyrene	U		0.0000170	0.0000500	1	06/26/2020 00:12	WG1497672
2-Methylnaphthalene	U		0.0000280	0.000500	1	06/26/2020 00:12	WG1497672
(S) Nitrobenzene-d5	86.1			11.0-135		06/26/2020 00:12	WG1497672
(S) 2-Fluorobiphenyl	70.6			32.0-120		06/26/2020 00:12	WG1497672
(S) p-Terphenyl-d14	74.4			23.0-122		06/26/2020 00:12	WG1497672
(S) 2-Methylnaphthalene-D10	62.8			50.0-150		06/26/2020 00:12	WG1497672
(S) Fluoranthene-D10	66.7			50.0-150		06/26/2020 00:12	WG1497672

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/23/2020 16:34	WG1496709
Dibenzofuran	U		0.0000970	0.0100	1	06/23/2020 16:34	WG1496709
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/23/2020 16:34	WG1496709
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/23/2020 16:34	WG1496709
2-Methylphenol	U		0.0000929	0.0100	1	06/23/2020 16:34	WG1496709
3&4-methyl phenol	U		0.000168	0.0100	1	06/23/2020 16:34	WG1496709
Phenol	U		0.00433	0.0100	1	06/23/2020 16:34	WG1496709
Pentachlorophenol	U		0.000313	0.00100	1	06/23/2020 16:34	WG1496709
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/23/2020 16:34	WG1496709
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/23/2020 16:34	WG1496709
(S) 2-Fluorophenol	44.3			10.0-120		06/23/2020 16:34	WG1496709
(S) Phenol-d5	27.5			10.0-120		06/23/2020 16:34	WG1496709
(S) Nitrobenzene-d5	65.4			10.0-127		06/23/2020 16:34	WG1496709
(S) 2-Fluorobiphenyl	70.8			10.0-130		06/23/2020 16:34	WG1496709
(S) 2,4,6-Tribromophenol	83.0			10.0-155		06/23/2020 16:34	WG1496709
(S) p-Terphenyl-d14	83.1			10.0-128		06/23/2020 16:34	WG1496709



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 16:58	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 16:58	WG1498313
(S) Toluene-d8	107			80.0-120		06/24/2020 16:58	WG1498313
(S) 4-Bromofluorobenzene	104			77.0-126		06/24/2020 16:58	WG1498313
(S) 1,2-Dichloroethane-d4	124			70.0-130		06/24/2020 16:58	WG1498313

¹ Cp² Tc³ Ss⁴ Cn

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/25/2020 17:24	WG1497670
Dibenzofuran	U		0.0000970	0.0100	1	06/25/2020 17:24	WG1497670
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/25/2020 17:24	WG1497670
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/25/2020 17:24	WG1497670
2-Methylphenol	U		0.0000929	0.0100	1	06/25/2020 17:24	WG1497670
3&4-methyl phenol	U		0.000168	0.0100	1	06/25/2020 17:24	WG1497670
Phenol	U		0.00433	0.0100	1	06/25/2020 17:24	WG1497670
Pentachlorophenol	U		0.000313	0.00100	1	06/25/2020 17:24	WG1497670
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/25/2020 17:24	WG1497670
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/25/2020 17:24	WG1497670
(S) 2-Fluorophenol	37.7			10.0-120		06/25/2020 17:24	WG1497670
(S) Phenol-d5	22.5			10.0-120		06/25/2020 17:24	WG1497670
(S) Nitrobenzene-d5	61.7			10.0-127		06/25/2020 17:24	WG1497670
(S) 2-Fluorobiphenyl	67.0			10.0-130		06/25/2020 17:24	WG1497670
(S) 2,4,6-Tribromophenol	74.2			10.0-155		06/25/2020 17:24	WG1497670
(S) p-Terphenyl-d14	78.3			10.0-128		06/25/2020 17:24	WG1497670

⁵ Sr⁶ Qc⁷ Gl⁸ Al⁹ Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/25/2020 08:32	WG1497880
Acenaphthene	U		0.0000190	0.0000500	1	06/25/2020 08:32	WG1497880
Acenaphthylene	U		0.0000171	0.0000500	1	06/25/2020 08:32	WG1497880
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/25/2020 08:32	WG1497880
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/25/2020 08:32	WG1497880
Chrysene	U		0.0000179	0.0000500	1	06/25/2020 08:32	WG1497880
Fluoranthene	0.0000324	J	0.0000270	0.000100	1	06/25/2020 08:32	WG1497880
Fluorene	U		0.0000169	0.0000500	1	06/25/2020 08:32	WG1497880
Naphthalene	U		0.0000917	0.000250	1	06/25/2020 08:32	WG1497880
Phenanthrene	U		0.0000180	0.0000500	1	06/25/2020 08:32	WG1497880
Pyrene	U		0.0000169	0.0000500	1	06/25/2020 08:32	WG1497880
2-Methylnaphthalene	U		0.0000674	0.000250	1	06/25/2020 08:32	WG1497880
(S) Nitrobenzene-d5	159			31.0-160		06/25/2020 08:32	WG1497880
(S) 2-Fluorobiphenyl	107			48.0-148		06/25/2020 08:32	WG1497880
(S) p-Terphenyl-d14	89.5			37.0-146		06/25/2020 08:32	WG1497880



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 17:22	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 17:22	WG1498313
(S) Toluene-d8	108			80.0-120		06/24/2020 17:22	WG1498313
(S) 4-Bromofluorobenzene	108			77.0-126		06/24/2020 17:22	WG1498313
(S) 1,2-Dichloroethane-d4	126			70.0-130		06/24/2020 17:22	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	U		0.000111	0.0100	1	06/25/2020 17:45	WG1497670
Dibenzofuran	0.00116	J	0.0000970	0.0100	1	06/25/2020 17:45	WG1497670
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/25/2020 17:45	WG1497670
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/25/2020 17:45	WG1497670
2-Methylphenol	U		0.0000929	0.0100	1	06/25/2020 17:45	WG1497670
3&4-methyl phenol	U		0.000168	0.0100	1	06/25/2020 17:45	WG1497670
Phenol	U		0.00433	0.0100	1	06/25/2020 17:45	WG1497670
Pentachlorophenol	U		0.000313	0.00100	1	06/25/2020 17:45	WG1497670
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/25/2020 17:45	WG1497670
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/25/2020 17:45	WG1497670
(S) 2-Fluorophenol	38.8			10.0-120		06/25/2020 17:45	WG1497670
(S) Phenol-d5	24.8			10.0-120		06/25/2020 17:45	WG1497670
(S) Nitrobenzene-d5	62.2			10.0-127		06/25/2020 17:45	WG1497670
(S) 2-Fluorobiphenyl	65.1			10.0-130		06/25/2020 17:45	WG1497670
(S) 2,4,6-Tribromophenol	74.2			10.0-155		06/25/2020 17:45	WG1497670
(S) p-Terphenyl-d14	78.9			10.0-128		06/25/2020 17:45	WG1497670

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/25/2020 18:41	WG1498394
Acenaphthene	0.00199		0.0000190	0.0000500	1	06/25/2020 18:41	WG1498394
Acenaphthylene	0.0000256	J	0.0000171	0.0000500	1	06/25/2020 18:41	WG1498394
Benzo(b)fluoranthene	U		0.0000168	0.0000500	1	06/25/2020 18:41	WG1498394
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/25/2020 18:41	WG1498394
Chrysene	U		0.0000179	0.0000500	1	06/25/2020 18:41	WG1498394
Fluoranthene	0.0000340	J	0.0000270	0.000100	1	06/25/2020 18:41	WG1498394
Fluorene	0.00105		0.0000169	0.0000500	1	06/25/2020 18:41	WG1498394
Naphthalene	0.0591		0.0000917	0.000250	1	06/25/2020 18:41	WG1498394
Phenanthrene	0.000566		0.0000180	0.0000500	1	06/25/2020 18:41	WG1498394
Pyrene	U		0.0000169	0.0000500	1	06/25/2020 18:41	WG1498394
2-Methylnaphthalene	0.00521		0.0000674	0.000250	1	06/25/2020 18:41	WG1498394
(S) Nitrobenzene-d5	142			31.0-160		06/25/2020 18:41	WG1498394
(S) 2-Fluorobiphenyl	72.1			48.0-148		06/25/2020 18:41	WG1498394
(S) p-Terphenyl-d14	86.8			37.0-146		06/25/2020 18:41	WG1498394



Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylbenzene	U		0.000137	0.00100	1	06/24/2020 17:45	WG1498313
Total Xylenes	U		0.000174	0.00300	1	06/24/2020 17:45	WG1498313
(S) Toluene-d8	111			80.0-120		06/24/2020 17:45	WG1498313
(S) 4-Bromofluorobenzene	112			77.0-126		06/24/2020 17:45	WG1498313
(S) 1,2-Dichloroethane-d4	124			70.0-130		06/24/2020 17:45	WG1498313

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Carbazole	0.000144	J	0.000111	0.0100	1	06/25/2020 18:05	WG1497670
Dibenzofuran	0.00152	J	0.0000970	0.0100	1	06/25/2020 18:05	WG1497670
2,4-Dichlorophenol	U		0.000102	0.0100	1	06/25/2020 18:05	WG1497670
2,4-Dimethylphenol	U		0.0000636	0.0100	1	06/25/2020 18:05	WG1497670
2-Methylphenol	U		0.0000929	0.0100	1	06/25/2020 18:05	WG1497670
3&4-methyl phenol	U		0.000168	0.0100	1	06/25/2020 18:05	WG1497670
Phenol	U		0.00433	0.0100	1	06/25/2020 18:05	WG1497670
Pentachlorophenol	U		0.000313	0.00100	1	06/25/2020 18:05	WG1497670
2,4,6-Trichlorophenol	U		0.000100	0.0100	1	06/25/2020 18:05	WG1497670
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100	1	06/25/2020 18:05	WG1497670
(S) 2-Fluorophenol	40.2			10.0-120		06/25/2020 18:05	WG1497670
(S) Phenol-d5	25.4			10.0-120		06/25/2020 18:05	WG1497670
(S) Nitrobenzene-d5	62.8			10.0-127		06/25/2020 18:05	WG1497670
(S) 2-Fluorobiphenyl	68.7			10.0-130		06/25/2020 18:05	WG1497670
(S) 2,4,6-Tribromophenol	77.5			10.0-155		06/25/2020 18:05	WG1497670
(S) p-Terphenyl-d14	74.0			10.0-128		06/25/2020 18:05	WG1497670

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	U		0.0000190	0.0000500	1	06/25/2020 19:05	WG1498394
Acenaphthene	0.00165		0.0000190	0.0000500	1	06/25/2020 19:05	WG1498394
Acenaphthylene	0.0000206	J	0.0000171	0.0000500	1	06/25/2020 19:05	WG1498394
Benzo(b)fluoranthene	0.0000170	J	0.0000168	0.0000500	1	06/25/2020 19:05	WG1498394
Benzo(k)fluoranthene	U		0.0000202	0.0000500	1	06/25/2020 19:05	WG1498394
Chrysene	U		0.0000179	0.0000500	1	06/25/2020 19:05	WG1498394
Fluoranthene	0.0000371	J	0.0000270	0.000100	1	06/25/2020 19:05	WG1498394
Fluorene	0.000888		0.0000169	0.0000500	1	06/25/2020 19:05	WG1498394
Naphthalene	0.0417		0.0000917	0.000250	1	06/25/2020 19:05	WG1498394
Phenanthrene	0.000400		0.0000180	0.0000500	1	06/25/2020 19:05	WG1498394
Pyrene	0.0000397	J	0.0000169	0.0000500	1	06/25/2020 19:05	WG1498394
2-Methylnaphthalene	0.00323		0.0000674	0.000250	1	06/25/2020 19:05	WG1498394
(S) Nitrobenzene-d5	145			31.0-160		06/25/2020 19:05	WG1498394
(S) 2-Fluorobiphenyl	81.1			48.0-148		06/25/2020 19:05	WG1498394
(S) p-Terphenyl-d14	85.3			37.0-146		06/25/2020 19:05	WG1498394



Method Blank (MB)

(MB) R3542550-2 06/24/20 13:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ethylbenzene	U		0.000137	0.00100
Xylenes, Total	U		0.000174	0.00300
(S) Toluene-d8	108			80.0-120
(S) 4-Bromofluorobenzene	105			77.0-126
(S) 1,2-Dichloroethane-d4	120			70.0-130

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS)

(LCS) R3542550-1 06/24/20 12:19

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ethylbenzene	0.00500	0.00431	86.2	79.0-123	
Xylenes, Total	0.0150	0.0131	87.3	79.0-123	
(S) Toluene-d8			103	80.0-120	
(S) 4-Bromofluorobenzene			103	77.0-126	
(S) 1,2-Dichloroethane-d4			119	70.0-130	

Method Blank (MB)

(MB) R3543279-3 06/25/20 23:52

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000190	0.0000500
Acenaphthene	U		0.0000190	0.0000500
Acenaphthylene	U		0.0000170	0.0000500
Benzo(b)fluoranthene	U		0.0000170	0.0000500
Benzo(k)fluoranthene	U		0.0000200	0.000250
Chrysene	U		0.0000180	0.0000500
Fluoranthene	U		0.0000110	0.0000500
Fluorene	U		0.0000170	0.0000500
Naphthalene	U		0.000128	0.000500
Phenanthrene	U		0.0000180	0.0000500
Pyrene	U		0.0000170	0.0000500
2-Methylnaphthalene	U		0.0000280	0.000500
(S) Nitrobenzene-d5	82.5			11.0-135
(S) 2-Methylnaphthalene-d10	62.0			50.0-150
(S) 2-Fluorobiphenyl	69.5			32.0-120
(S) Fluoranthene-d10	66.5			50.0-150
(S) p-Terphenyl-d14	75.0			23.0-122

1

Cp

2

Tc

3

Ss

4

Cn

5

Sr

6

Qc

7

Gl

8

Al

9

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3543279-1 06/25/20 23:12 • (LCSD) R3543279-2 06/25/20 23:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00138	0.00135	69.0	67.5	43.0-127			2.20	20
Acenaphthene	0.00200	0.00149	0.00149	74.5	74.5	42.0-120			0.000	20
Acenaphthylene	0.00200	0.00147	0.00149	73.5	74.5	43.0-120			1.35	20
Benzo(b)fluoranthene	0.00200	0.00131	0.00134	65.5	67.0	43.0-122			2.26	20
Benzo(k)fluoranthene	0.00200	0.00135	0.00139	67.5	69.5	39.0-128			2.92	22
Chrysene	0.00200	0.00143	0.00143	71.5	71.5	42.0-129			0.000	20
Fluoranthene	0.00200	0.00143	0.00141	71.5	70.5	48.0-131			1.41	20
Fluorene	0.00200	0.00145	0.00145	72.5	72.5	42.0-120			0.000	20
Naphthalene	0.00200	0.00140	0.00142	70.0	71.0	30.0-120			1.42	22
Phenanthrene	0.00200	0.00150	0.00146	75.0	73.0	42.0-120			2.70	20
Pyrene	0.00200	0.00158	0.00159	79.0	79.5	38.0-124			0.631	20
2-Methylnaphthalene	0.00200	0.00138	0.00139	69.0	69.5	40.0-120			0.722	20
(S) Nitrobenzene-d5				81.5	81.5	11.0-135				
(S) 2-Methylnaphthalene-d10				62.0	62.5	50.0-150				
(S) 2-Fluorobiphenyl				69.0	69.5	32.0-120				
(S) Fluoranthene-d10				67.0	67.0	50.0-150				



Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3543279-1 06/25/20 23:12 • (LCSD) R3543279-2 06/25/20 23:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
(S) p-Terphenyl-d14				72.5	73.0	23.0-122				

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc



Method Blank (MB)

(MB) R3542249-2 06/23/20 14:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Carbazole	U		0.000111	0.0100
Dibenzofuran	U		0.0000970	0.0100
2-Methylphenol	U		0.0000929	0.0100
3&4-Methyl Phenol	U		0.000168	0.0100
2,4-Dichlorophenol	U		0.000102	0.0100
2,4-Dimethylphenol	U		0.0000636	0.0100
Pentachlorophenol	U		0.000313	0.00100
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100
Phenol	U		0.00433	0.0100
2,4,6-Trichlorophenol	U		0.000100	0.0100
(S) Nitrobenzene-d5	65.6			10.0-127
(S) 2-Fluorobiphenyl	75.5			10.0-130
(S) p-Terphenyl-d14	85.2			10.0-128
(S) Phenol-d5	29.0			10.0-120
(S) 2-Fluorophenol	44.9			10.0-120
(S) 2,4,6-Tribromophenol	83.5			10.0-155

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3542249-1 06/23/20 13:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Carbazole	0.0500	0.0415	83.0	51.0-122	
Dibenzofuran	0.0500	0.0414	82.8	44.0-120	
2-Methylphenol	0.0500	0.0345	69.0	28.0-120	
3&4-Methyl Phenol	0.0500	0.0330	66.0	31.0-120	
2,4-Dichlorophenol	0.0500	0.0346	69.2	36.0-120	
2,4-Dimethylphenol	0.0500	0.0352	70.4	33.0-120	
Pentachlorophenol	0.0500	0.0408	81.6	23.0-120	
Phenol	0.0500	0.0144	28.8	10.0-120	
2,4,6-Trichlorophenol	0.0500	0.0404	80.8	42.0-120	
2,3,4,6-Tetrachlorophenol	0.0500	0.0455	91.0	42.0-132	
(S) Nitrobenzene-d5			61.7	10.0-127	
(S) 2-Fluorobiphenyl			83.1	10.0-130	
(S) p-Terphenyl-d14			89.0	10.0-128	
(S) Phenol-d5			29.5	10.0-120	
(S) 2-Fluorophenol			46.5	10.0-120	
(S) 2,4,6-Tribromophenol			98.5	10.0-155	

L1231742-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231742-06 06/23/20 15:09 • (MS) R3542249-3 06/23/20 15:31 • (MSD) R3542249-4 06/23/20 15:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Carbazole	0.0455	0.00503	0.0432	0.0394	83.9	75.5	1	38.0-127			9.20	21
Dibenzofuran	0.0455	0.00164	0.0381	0.0354	80.1	74.2	1	32.0-120			7.35	26
2-Methylphenol	0.0455	U	0.0304	0.0295	66.8	64.8	1	10.0-120			3.01	30
3&4-Methyl Phenol	0.0455	U	0.0297	0.0287	65.3	63.1	1	10.0-120			3.42	36
2,4-Dichlorophenol	0.0455	U	0.0312	0.0304	68.6	66.8	1	19.0-120			2.60	27
2,4-Dimethylphenol	0.0455	U	0.0324	0.0318	71.2	69.9	1	15.0-120			1.87	28
Pentachlorophenol	0.0455	U	0.0380	0.0353	83.5	77.6	1	10.0-128			7.37	37
Phenol	0.0455	U	0.0152	0.0130	33.4	28.6	1	10.0-120			15.6	40
2,4,6-Trichlorophenol	0.0455	U	0.0351	0.0340	77.1	74.7	1	26.0-120			3.18	31
2,3,4,6-Tetrachlorophenol	0.0455	U	0.0417	0.0384	91.6	84.4	1	17.0-142			8.24	34
(S) Nitrobenzene-d5					60.5	57.9		10.0-127				
(S) 2-Fluorobiphenyl					76.3	75.4		10.0-130				
(S) p-Terphenyl-d14					88.8	82.4		10.0-128				
(S) Phenol-d5					27.9	28.0		10.0-120				
(S) 2-Fluorophenol					44.0	43.8		10.0-120				
(S) 2,4,6-Tribromophenol					94.5	91.2		10.0-155				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3542952-3 06/25/20 12:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Carbazole	U		0.000111	0.0100
Dibenzofuran	U		0.0000970	0.0100
2-Methylphenol	U		0.0000929	0.0100
3&4-Methyl Phenol	U		0.000168	0.0100
2,4-Dichlorophenol	U		0.000102	0.0100
2,4-Dimethylphenol	U		0.0000636	0.0100
Pentachlorophenol	U		0.000313	0.00100
2,3,4,6-Tetrachlorophenol	U		0.000231	0.0100
Phenol	U		0.00433	0.0100
2,4,6-Trichlorophenol	U		0.000100	0.0100
(S) Nitrobenzene-d5	63.4			10.0-127
(S) 2-Fluorobiphenyl	69.0			10.0-130
(S) p-Terphenyl-d14	73.2			10.0-128
(S) Phenol-d5	24.8			10.0-120
(S) 2-Fluorophenol	40.8			10.0-120
(S) 2,4,6-Tribromophenol	68.5			10.0-155

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3542952-1 06/25/20 11:34 • (LCSD) R3542952-2 06/25/20 11:54

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Carbazole	0.0500	0.0404	0.0407	80.8	81.4	51.0-122			0.740	20
Dibenzofuran	0.0500	0.0403	0.0383	80.6	76.6	44.0-120			5.09	22
2-Methylphenol	0.0500	0.0351	0.0324	70.2	64.8	28.0-120			8.00	29
3&4-Methyl Phenol	0.0500	0.0339	0.0320	67.8	64.0	31.0-120			5.77	30
2,4-Dichlorophenol	0.0500	0.0350	0.0333	70.0	66.6	36.0-120			4.98	26
2,4-Dimethylphenol	0.0500	0.0344	0.0325	68.8	65.0	33.0-120			5.68	26
Pentachlorophenol	0.0500	0.0346	0.0314	69.2	62.8	23.0-120			9.70	25
Phenol	0.0500	0.0189	0.0177	37.8	35.4	10.0-120			6.56	36
2,4,6-Trichlorophenol	0.0500	0.0388	0.0361	77.6	72.2	42.0-120			7.21	23
2,3,4,6-Tetrachlorophenol	0.0500	0.0437	0.0410	87.4	82.0	42.0-132			6.38	22
(S) Nitrobenzene-d5				61.5	58.7	10.0-127				
(S) 2-Fluorobiphenyl				74.4	69.3	10.0-130				
(S) p-Terphenyl-d14				79.5	77.3	10.0-128				
(S) Phenol-d5				29.2	27.9	10.0-120				
(S) 2-Fluorophenol				46.1	42.7	10.0-120				
(S) 2,4,6-Tribromophenol				85.5	82.0	10.0-155				

Method Blank (MB)

(MB) R3542178-3 06/23/20 22:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000190	0.0000500
Acenaphthene	U		0.0000190	0.0000500
Acenaphthylene	U		0.0000171	0.0000500
Benzo(b)fluoranthene	U		0.0000168	0.0000500
Benzo(k)fluoranthene	U		0.0000202	0.0000500
Chrysene	U		0.0000179	0.0000500
Fluoranthene	U		0.0000270	0.000100
Fluorene	U		0.0000169	0.0000500
Naphthalene	U		0.0000917	0.000250
Phenanthrene	U		0.0000180	0.0000500
Pyrene	U		0.0000169	0.0000500
2-Methylnaphthalene	U		0.0000674	0.000250
(S) Nitrobenzene-d5	103			31.0-160
(S) 2-Fluorobiphenyl	90.0			48.0-148
(S) p-Terphenyl-d14	96.0			37.0-146

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3542178-1 06/23/20 22:10 • (LCSD) R3542178-2 06/23/20 22:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00180	0.00180	90.0	90.0	67.0-150			0.000	20
Acenaphthene	0.00200	0.00193	0.00193	96.5	96.5	65.0-138			0.000	20
Acenaphthylene	0.00200	0.00192	0.00194	96.0	97.0	66.0-140			1.04	20
Benzo(b)fluoranthene	0.00200	0.00184	0.00175	92.0	87.5	58.0-141			5.01	20
Benzo(k)fluoranthene	0.00200	0.00184	0.00179	92.0	89.5	58.0-148			2.75	20
Chrysene	0.00200	0.00186	0.00188	93.0	94.0	64.0-144			1.07	20
Fluoranthene	0.00200	0.00183	0.00184	91.5	92.0	69.0-153			0.545	20
Fluorene	0.00200	0.00187	0.00189	93.5	94.5	64.0-136			1.06	20
Naphthalene	0.00200	0.00182	0.00182	91.0	91.0	61.0-137			0.000	20
Phenanthrene	0.00200	0.00188	0.00190	94.0	95.0	62.0-137			1.06	20
Pyrene	0.00200	0.00206	0.00210	103	105	60.0-142			1.92	20
2-Methylnaphthalene	0.00200	0.00180	0.00185	90.0	92.5	62.0-136			2.74	20
(S) Nitrobenzene-d5				113	103	31.0-160				
(S) 2-Fluorobiphenyl				94.5	91.5	48.0-148				
(S) p-Terphenyl-d14				94.5	94.5	37.0-146				



Method Blank (MB)

(MB) R3541724-2 06/23/20 09:42

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000190	0.0000500
Acenaphthene	U		0.0000190	0.0000500
Acenaphthylene	U		0.0000171	0.0000500
Benzo(b)fluoranthene	U		0.0000168	0.0000500
Benzo(k)fluoranthene	U		0.0000202	0.0000500
Chrysene	U		0.0000179	0.0000500
Fluoranthene	U		0.0000270	0.000100
Fluorene	U		0.0000169	0.0000500
Naphthalene	U		0.0000917	0.000250
Phenanthrene	U		0.0000180	0.0000500
Pyrene	U		0.0000169	0.0000500
2-Methylnaphthalene	U		0.0000674	0.000250
(S) Nitrobenzene-d5	114			31.0-160
(S) 2-Fluorobiphenyl	103			48.0-148
(S) p-Terphenyl-d14	107			37.0-146

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3541724-1 06/23/20 09:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.00200	0.00181	90.5	67.0-150	
Acenaphthene	0.00200	0.00188	94.0	65.0-138	
Acenaphthylene	0.00200	0.00191	95.5	66.0-140	
Benzo(b)fluoranthene	0.00200	0.00174	87.0	58.0-141	
Benzo(k)fluoranthene	0.00200	0.00179	89.5	58.0-148	
Chrysene	0.00200	0.00189	94.5	64.0-144	
Fluoranthene	0.00200	0.00187	93.5	69.0-153	
Fluorene	0.00200	0.00185	92.5	64.0-136	
Naphthalene	0.00200	0.00169	84.5	61.0-137	
Phenanthrene	0.00200	0.00190	95.0	62.0-137	
Pyrene	0.00200	0.00200	100	60.0-142	
2-Methylnaphthalene	0.00200	0.00171	85.5	62.0-136	
(S) Nitrobenzene-d5			104	31.0-160	
(S) 2-Fluorobiphenyl			93.5	48.0-148	
(S) p-Terphenyl-d14			94.5	37.0-146	

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

L1231742-03,04,05,07

L1231366-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231366-01 06/23/20 10:22 • (MS) R3541724-3 06/23/20 10:42 • (MSD) R3541724-4 06/23/20 11:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00190	0.000148	0.00219	0.00210	107	103	1	56.0-156			4.20	20
Acenaphthene	0.00190	0.000268	0.00221	0.00219	102	101	1	44.0-153			0.909	20
Acenaphthylene	0.00190	0.0000622	0.00209	0.00206	107	105	1	53.0-150			1.45	20
Benzo(b)fluoranthene	0.00190	U	0.00172	0.00167	90.5	87.9	1	43.0-142			2.95	20
Benzo(k)fluoranthene	0.00190	U	0.00177	0.00173	93.2	91.1	1	43.0-148			2.29	21
Chrysene	0.00190	U	0.00189	0.00186	99.5	97.9	1	50.0-148			1.60	20
Fluoranthene	0.00190	0.0000494	0.00210	0.00200	108	103	1	56.0-157			4.88	20
Fluorene	0.00190	0.000256	0.00217	0.00211	101	97.6	1	48.0-148			2.80	20
Naphthalene	0.00190	U	0.00185	0.00181	97.4	95.3	1	10.0-160			2.19	20
Phenanthrene	0.00190	0.000222	0.00205	0.00197	96.2	92.0	1	47.0-147			3.98	20
Pyrene	0.00190	0.000142	0.00213	0.00210	105	103	1	51.0-148			1.42	20
2-Methylnaphthalene	0.00190	U	0.00194	0.00186	102	97.9	1	31.0-160			4.21	20
(S) Nitrobenzene-d5					114	110		31.0-160				
(S) 2-Fluorobiphenyl					98.9	96.3		48.0-148				
(S) p-Terphenyl-d14					93.2	91.1		37.0-146				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3542237-2 06/24/20 09:18

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000190	0.0000500
Acenaphthene	U		0.0000190	0.0000500
Acenaphthylene	U		0.0000171	0.0000500
Benzo(b)fluoranthene	U		0.0000168	0.0000500
Benzo(k)fluoranthene	U		0.0000202	0.0000500
Chrysene	U		0.0000179	0.0000500
Fluoranthene	U		0.0000270	0.000100
Fluorene	U		0.0000169	0.0000500
Naphthalene	U		0.0000917	0.000250
Phenanthrene	U		0.0000180	0.0000500
Pyrene	U		0.0000169	0.0000500
2-Methylnaphthalene	U		0.0000674	0.000250
(S) Nitrobenzene-d5	119			31.0-160
(S) 2-Fluorobiphenyl	108			48.0-148
(S) p-Terphenyl-d14	117			37.0-146

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS)

(LCS) R3542237-1 06/24/20 08:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Anthracene	0.00200	0.00200	100	67.0-150	
Acenaphthene	0.00200	0.00212	106	65.0-138	
Acenaphthylene	0.00200	0.00213	106	66.0-140	
Benzo(b)fluoranthene	0.00200	0.00193	96.5	58.0-141	
Benzo(k)fluoranthene	0.00200	0.00185	92.5	58.0-148	
Chrysene	0.00200	0.00201	100	64.0-144	
Fluoranthene	0.00200	0.00204	102	69.0-153	
Fluorene	0.00200	0.00206	103	64.0-136	
Naphthalene	0.00200	0.00201	100	61.0-137	
Phenanthrene	0.00200	0.00208	104	62.0-137	
Pyrene	0.00200	0.00227	114	60.0-142	
2-Methylnaphthalene	0.00200	0.00201	100	62.0-136	
(S) Nitrobenzene-d5			115	31.0-160	
(S) 2-Fluorobiphenyl			102	48.0-148	
(S) p-Terphenyl-d14			98.5	37.0-146	

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

L1231742-06

L1231742-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1231742-06 06/24/20 09:58 • (MS) R3542237-3 06/24/20 10:18 • (MSD) R3542237-4 06/24/20 10:38

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.0000325	0.00199	0.00195	97.9	95.9	1	56.0-156			2.03	20
Acenaphthene	0.00200	0.000509	0.00257	0.00250	103	99.5	1	44.0-153			2.76	20
Acenaphthylene	0.00200	U	0.00206	0.00199	103	99.5	1	53.0-150			3.46	20
Benzo(b)fluoranthene	0.00200	U	0.00179	0.00172	89.5	86.0	1	43.0-142			3.99	20
Benzo(k)fluoranthene	0.00200	U	0.00189	0.00178	94.5	89.0	1	43.0-148			5.99	21
Chrysene	0.00200	U	0.00197	0.00190	98.5	95.0	1	50.0-148			3.62	20
Fluoranthene	0.00200	0.0000280	0.00199	0.00192	98.1	94.6	1	56.0-157			3.58	20
Fluorene	0.00200	0.00440	0.00646	0.00639	103	99.5	1	48.0-148			1.09	20
Naphthalene	0.00200	0.00609	0.00809	0.00806	100	98.5	1	10.0-160			0.372	20
Phenanthrene	0.00200	0.000937	0.00298	0.00289	102	97.6	1	47.0-147			3.07	20
Pyrene	0.00200	U	0.00223	0.00219	111	109	1	51.0-148			1.81	20
2-Methylnaphthalene	0.00200	0.00138	0.00330	0.00325	96.0	93.5	1	31.0-160			1.53	20
(S) Nitrobenzene-d5					108	103		31.0-160				
(S) 2-Fluorobiphenyl					100	97.0		48.0-148				
(S) p-Terphenyl-d14					100	96.5		37.0-146				

1Cp

2Tc

3Ss

4Cn

5Sr

6Qc

7Gl

8Al

9Sc

Method Blank (MB)

(MB) R3542739-3 06/25/20 01:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000190	0.0000500
Acenaphthene	U		0.0000190	0.0000500
Acenaphthylene	U		0.0000171	0.0000500
Benzo(b)fluoranthene	U		0.0000168	0.0000500
Benzo(k)fluoranthene	U		0.0000202	0.0000500
Chrysene	U		0.0000179	0.0000500
Fluoranthene	U		0.0000270	0.000100
Fluorene	U		0.0000169	0.0000500
Naphthalene	U		0.0000917	0.000250
Phenanthrene	U		0.0000180	0.0000500
Pyrene	U		0.0000169	0.0000500
2-Methylnaphthalene	U		0.0000674	0.000250
(S) Nitrobenzene-d5	132			31.0-160
(S) 2-Fluorobiphenyl	95.0			48.0-148
(S) p-Terphenyl-d14	91.5			37.0-146

¹Cp

²Tc

³Ss

⁴Cn

⁵Sr

⁶Qc

⁷Gl

⁸Al

⁹Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3542739-1 06/25/20 01:07 • (LCSD) R3542739-2 06/25/20 01:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00242	0.00235	121	117	67.0-150			2.94	20
Acenaphthene	0.00200	0.00204	0.00199	102	99.5	65.0-138			2.48	20
Acenaphthylene	0.00200	0.00200	0.00196	100	98.0	66.0-140			2.02	20
Benzo(b)fluoranthene	0.00200	0.00237	0.00228	118	114	58.0-141			3.87	20
Benzo(k)fluoranthene	0.00200	0.00245	0.00262	122	131	58.0-148			6.71	20
Chrysene	0.00200	0.00247	0.00243	123	122	64.0-144			1.63	20
Fluoranthene	0.00200	0.00246	0.00243	123	122	69.0-153			1.23	20
Fluorene	0.00200	0.00211	0.00205	105	103	64.0-136			2.88	20
Naphthalene	0.00200	0.00208	0.00203	104	102	61.0-137			2.43	20
Phenanthrene	0.00200	0.00215	0.00210	107	105	62.0-137			2.35	20
Pyrene	0.00200	0.00226	0.00221	113	111	60.0-142			2.24	20
2-Methylnaphthalene	0.00200	0.00192	0.00188	96.0	94.0	62.0-136			2.11	20
(S) Nitrobenzene-d5				133	130	31.0-160				
(S) 2-Fluorobiphenyl				95.0	92.5	48.0-148				
(S) p-Terphenyl-d14				88.5	87.0	37.0-146				



Method Blank (MB)

(MB) R3543018-3 06/25/20 14:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000190	0.0000500
Acenaphthene	U		0.0000190	0.0000500
Acenaphthylene	U		0.0000171	0.0000500
Benzo(b)fluoranthene	U		0.0000168	0.0000500
Benzo(k)fluoranthene	U		0.0000202	0.0000500
Chrysene	U		0.0000179	0.0000500
Fluoranthene	U		0.0000270	0.000100
Fluorene	U		0.0000169	0.0000500
Naphthalene	U		0.0000917	0.000250
Phenanthrene	U		0.0000180	0.0000500
Pyrene	U		0.0000169	0.0000500
2-Methylnaphthalene	U		0.0000674	0.000250
(S) Nitrobenzene-d5	139			31.0-160
(S) 2-Fluorobiphenyl	80.5			48.0-148
(S) p-Terphenyl-d14	91.5			37.0-146

Cp

Tc

Ss

Cn

Sr

Qc

Gl

Al

Sc

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3543018-1 06/25/20 13:34 • (LCSD) R3543018-2 06/25/20 13:57

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00228	0.00225	114	112	67.0-150			1.32	20
Acenaphthene	0.00200	0.00189	0.00187	94.5	93.5	65.0-138			1.06	20
Acenaphthylene	0.00200	0.00196	0.00173	98.0	86.5	66.0-140			12.5	20
Benzo(b)fluoranthene	0.00200	0.00229	0.00216	115	108	58.0-141			5.84	20
Benzo(k)fluoranthene	0.00200	0.00243	0.00252	122	126	58.0-148			3.64	20
Chrysene	0.00200	0.00240	0.00237	120	118	64.0-144			1.26	20
Fluoranthene	0.00200	0.00279	0.00235	140	117	69.0-153			17.1	20
Fluorene	0.00200	0.00198	0.00198	99.0	99.0	64.0-136			0.000	20
Naphthalene	0.00200	0.00175	0.00175	87.5	87.5	61.0-137			0.000	20
Phenanthrene	0.00200	0.00202	0.00199	101	99.5	62.0-137			1.50	20
Pyrene	0.00200	0.00221	0.00219	111	109	60.0-142			0.909	20
2-Methylnaphthalene	0.00200	0.00157	0.00150	78.5	75.0	62.0-136			4.56	20
(S) Nitrobenzene-d5				138	128	31.0-160				
(S) 2-Fluorobiphenyl				79.0	65.5	48.0-148				
(S) p-Terphenyl-d14				89.0	88.0	37.0-146				



Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.
Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico ¹	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina ¹	DW21704
Georgia	NELAP	North Carolina ³	41
Georgia ¹	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LA000356
Kentucky ^{1 6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1 4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas ⁵	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations


A2LA – ISO 17025	1461.01	AIHA-LAP, LLC EMLAP	100789
A2LA – ISO 17025 ⁵	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

¹ Drinking Water ² Underground Storage Tanks ³ Aquatic Toxicity ⁴ Chemical/Microbiological ⁵ Mold ⁶ Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



EarthCon Consultants, Inc - Marietta, GA 1880 West Oak Pkwy.				Billing Information: Accounts Payable 1880 West Oak Pkwy, Bld 100, Suite106 Marietta, GA 30062				Pres Chk		Analysis / Container / Preservative								Chain of Custody Page 1 of 2 	
				Report to: Doug Seely				Email To: dseely@earthcon.com; dadkins@earthcon.com											
Project Description: IP Wiggins				City/State Collected: Wiggins, MS		Please Circle: PT MT CT ET												SDG # L1231742 H229	
Phone: 770-973-2100		Client Project # 02. Wiggins. 20		Lab Project # PREMOMGA-WIGGINSAP9														Acctnum: PREMOMGA Template: T168702	
Collected by (print): Kimberly Barfield		Site/Facility ID #		P.O. #														Prelogin: P776524 PM: 526 - Chris McCord	
Collected by (signature): Kimberly Barfield		Rush? (Lab MUST Be Notified) <input type="checkbox"/> Same Day <input type="checkbox"/> Five Day <input type="checkbox"/> Next Day <input type="checkbox"/> 5 Day (Rad Only) <input type="checkbox"/> Two Day <input type="checkbox"/> 10 Day (Rad Only) <input type="checkbox"/> Three Day		Quote #														PB: 08/06/2020	
Immediately Packed on Ice N <input type="checkbox"/> Y <input checked="" type="checkbox"/>				Date Results Needed				No. of Cntrs										Shipped Via: FedEX Ground	
Sample ID		Comp/Grab	Matrix *	Depth	Date	Time												Remarks Sample # (lab only)	
WP-1		Grab	GW		6-17-20	10:30	4	X	X									-01	
WP-2			GW			10:28	4	X	X									-02	
Dup-02			GW			10:35	4	X	X									-03	
WC-8A			GW			10:26	4	X	X									-04	
WC-43			GW			11:20	4	X	X									-05	
WCP-8			GW			12:07	4	X	X									-06	
WCP-8 MS/MSD			GW			12:07	4	X	X									-07	
EB-2			GW			11:43	4	X	X									-08	
WC-56			GW		6-18-20	08:44	4	X	X									-09	
Dup-03			GW			08:47	4	X	X									-10	
* Matrix: SS - Soil AIR - Air F - Filter GW - Groundwater B - Bioassay WW - WasteWater DW - Drinking Water OT - Other		Remarks:				pH _____ Temp _____ Flow _____ Other _____				Sample Receipt Checklist COC Seal Present/Intact: <input type="checkbox"/> NP <input checked="" type="checkbox"/> Y <input type="checkbox"/> N COC Signed/Accurate: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Bottles arrive intact: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Correct bottles used: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Sufficient volume sent: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N If Applicable VOA Zero Headspace: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N Preservation Correct/Checked: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N RAD Screen <0.5 mR/hr: <input checked="" type="checkbox"/> Y <input type="checkbox"/> N									
Samples returned via: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> Courier		Tracking # 1790 3033 3168																	
Relinquished by: (Signature) Kimberly Barfield		Date: 6-18-2020		Time: 17:00		Received by: (Signature)		Trip Blank Received: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No HCL/ MeOH TBR		Temp: 20.2 °C Bottles Received: 48								If preservation required by Login: Date/Time	
Relinquished by: (Signature)		Date:		Time:		Received by: (Signature)		Date:		Time:		Hold:				Condition: NCF / OK			

EarthCon Consultants, Inc - Marietta, GA

1880 West Oak Pkwy.

Report to:
Doug Seely

Project Description:
IP Wiggins

Phone: 770-973-2100

Collected by (print):
Kimberly Barfield

Collected by (signature):
Kimberly Barfield

Immediately
Packed on Ice N ☐ Y ☒

Billing Information:

Accounts Payable
1880 West Oak Pkwy, Bld 100,
Suite 106
Marietta, GA 30062

Email To:
dseely@earthcon.com; dadkins@earthcon.com

City/State
Collected: Wiggins, MS

Please Circle:
PT MT CT ET

Client Project #

08.200006.20

Lab Project #

PREMOMGA-WIGGINSAP9

Site/Facility ID #

P.O. #

Rush? (Lab MUST Be Notified)

☐ Same Day ☐ Five Day
☐ Next Day ☐ 5 Day (Rad Only)
☐ Two Day ☐ 10 Day (Rad Only)
☐ Three Day

Quote #

Date Results Needed

No.
of
Cntrs

Sample ID

Comp/Grab

Matrix *

Depth

Date

Time

No.
of
Cntrs

Analysis / Container / Preservative

Chain of Custody Page 2 of 2



12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

SDG # L1231742

Table #

Acctnum: PREMOMGA

Template: T168702

Prelogin: P776524

PM: 526 - Chris McCord

PB: 08/03/2020

Shipped Via: FedEx Ground

Remarks

Sample # (lab only)

WC-57
PUP-04

Grab
I

GW

GW

6/18/20

09:20

4

X

X

1

09:25

4

X

X

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks:

Samples returned via:
☐ UPS ☒ FedEx ☐ Courier

Tracking # 1790 3033 3168

pH Temp

Flow Other

Sample Receipt Checklist

COC Seal Present/Intact: ☐ NP ☒ Y ☐ N
COC Signed/Accurate: ☐ Y ☒ N
Bottles arrive intact: ☐ Y ☒ N
Correct bottles used: ☐ Y ☒ N
Sufficient volume sent: ☐ Y ☒ N
If Applicable
VOA Zero Headspace: ☐ Y ☒ N
Preservation Correct/Checked: ☐ Y ☒ N
RAD Screen <0.5 mR/hr: ☐ Y ☒ N

Relinquished by: (Signature)

Kimberly Barfield

Date:

6/18/20

Time:

17:00

Received by: (Signature)

Received by: (Signature)

Received for lab by: (Signature)

Trip Blank Received: Yes/No

Temp: 17.1°C
12.0-12.2
48

Bottles Received: 48

Date: 6/20/20

Time: 0845

If preservation required by Login: Date/Time

Hold:

Condition:

NCF ☒ OK

Memorandum

Date: July 29, 2020
To: Darrell Adkins, EarthCon Consultants
From: Carol Cummins, Project Scientist
Subject: Quality Assurance Review
Project: Groundwater Monitoring, International Paper Wiggins,
Mississippi
Sampling Dates: June 15-18, 2020
Project Number: 02.20000006.20
SDG Number: L1231742 and L1231761

1.0 Introduction

This memorandum presents the cursory validation of the sample analyses listed in Table 1. The samples were analyzed for selected volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and polycyclic aromatic hydrocarbons (PAHs) by Pace Analytical Services located in St. Rose, Louisiana.

The criteria used to qualify data are from the *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA 2008), the *Wiggins Groundwater Monitoring Plan/Sampling and Analysis Plan* (SAP; Premier 2010), the analytical methods, or the professional judgment of the validation chemist. The following laboratory deliverables were reviewed during the validation process:

- Chain-of-custody (COC) documentation to assess holding times and verify report completeness
- Laboratory quality control (QC) sample results, including method blanks, surrogate spikes, laboratory control samples (LCSs), laboratory control sample duplicates (LCSDs), and matrix spike/matrix spike duplicates (MS/MSDs)
- Analytical results to verify reporting limits
- Field QC samples to assess field blank contamination and field duplicate precision

The field duplicate precision is presented in Table 2 and the qualified data are summarized in Section 5. Data qualifier flags have been added to the sample results in the hardcopy laboratory report used for validation.

Table 1—Sample Data Reviewed

Sample ID	Laboratory ID	VOCs ^a	SVOCs (Full Scan) ^b	PAHs (SIM) ^c
WP-1	L1231742-01	X	X	X
WP-2	L1231742-02	X	X	X
DUP-02	L1231742-03	X	X	X
WC-8A	L1231742-04	X	X	X
WC-43	L1231742-05	X	X	X
WCP-8	L1231742-06	X	X	X
EB-2	L1231742-07	X	X	X
WC-56	L1231742-08	X	X	X
DUP-03	L1231742-09	X	X	X
WC-57	L1231742-10	X	X	X
DUP-04	L1231742-11	X	X	X
WC-8	L1231761-01		X	
WC-39	L1231761-02		X	
WC-41	L1231761-03		X	
WC-44	L1231761-04		X	
EB-1	L1231761-05		X	
WC-11	L1231761-06		X	
DUP-01	L1231761-07		X	
WC-26	L1231761-08		X	

^a Volatile organic compounds (ethylbenzene and total xylenes) by Method 8260B (USEPA 1996)

^b Semivolatile organic compounds (carbazole, dibenzofuran, 2,4-dichlorophenol, 2,4-dimethylphenol, 2-methylphenol, 3&4-methylphenol, phenol, pentachlorophenol, 2,4,6-trichlorophenol, and 2,3,4,6-tetrachlorophenol) by Method 3510C/8270 full scan (USEPA 1996)

^c Polycyclic aromatic hydrocarbons (anthracene, acenaphthene, acenaphthylene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene, and 2-methylnaphthylene) by Method 3510C/8270 selected ion monitoring (SIM) (USEPA 1996)

2.0 Data Validation Findings

2.1 Custody, Preservation, and Completeness

Sample custody was maintained as required from sample collection to receipt at the laboratory. The samples were received intact and were properly preserved. The report is complete and contains results for the samples and tests requested on the COC forms.

2.2 Volatile Organic Analyses

Selected samples were analyzed for ethylbenzene and total xylenes by Method 8260B.

2.2.1 Holding Times

The samples were analyzed within the required holding time of 14 days from collection for preserved water samples.

2.2.2 Blank Analyses

2.2.2.1 Method Blanks

A method blank was analyzed at the required frequency. Target VOCs were not detected above the method detection limits (MDLs) in the method blank.

2.2.2.2 Equipment Rinse Blanks

An equipment rinse blank (EB-2) was collected with the samples. Target VOCs were not detected above the MDLs in the rinse blank.

2.2.2.3 Trip Blanks

A trip blank was not collected with the samples.

2.2.3 Surrogate Analyses

Surrogate compounds were added to the sample, blanks, and QC samples as required. The recovery values are within the laboratory QC limits.

2.2.4 Matrix Spike/Matrix Spike Duplicate Analyses

A MS/MSD was not reported with the VOC analyses. The acceptable LCS recovery values indicate the accuracy of the analytical system is in control. Data qualifiers are not required due to the lack of QC results.

2.2.5 Laboratory Control Sample Analyses

LCSs were analyzed as required. The recovery values are within the laboratory QC limits.

2.2.6 Laboratory Reporting Limits

The permit-required reporting limits for ethylbenzene and total xylenes (SAP Table 4) were met by the reporting detection limits (RDLs).

2.2.7 Field Duplicates

Three field duplicate pairs were collected for VOC analyses: DUP-02/WP-2, DUP-03/WC-56, and DUP-04/WC-57. RPD values could not be calculated because no target VOCs were detected in the samples or their duplicates.

2.2.8 Overall Assessment of Data Usability

The usability of the data is based on the EPA guidance documents noted previously. Upon consideration of the information presented here, the data are acceptable for their intended use.

2.3 Semivolatile Organic Analyses (Full Scan and SIM)

The samples were analyzed for selected SVOCs compounds by Method 3510C/8270 full scan and selected samples were analyzed for polycyclic aromatic hydrocarbons (PAHs) by Method 3510C/8270 SIM.

2.3.1 Holding Times

The samples were extracted within the required holding time of seven days from collection. The sample extracts were analyzed within the required holding time of 40 days from extraction.

2.3.2 Blank Analyses

2.3.2.1 Method Blanks

Method blanks were analyzed at the required frequency of one per extraction batch for full scan and SIM analyses. Semivolatile organic compounds were not detected above the MDLs in the method blanks.

2.3.2.2 Equipment Rinse Blanks

Two equipment rinse blanks (EB-1 and EB-2) were collected with the samples. SVOCs were not detected above the MDLs in the equipment rinse blanks, except as noted below.

- Pentachlorophenol was detected in EB-2 at 0.00182 mg/L. Pace re-extracted and re-analyzed the sample and verified the initial result, which should be reported. Functional Guidelines prescribes three qualifications schemes for organic blank contamination reported to the MDL: associated sample concentrations greater than the action level (five times the blank concentration) are not qualified; associated sample concentrations less than the action limit and less than the RDL are qualified as not detected at the RDL and associated sample concentrations less than the action level and above the RDL are qualified as undetected (U) at the reported value. Two samples required qualification as shown below and in Section 5.

Sample ID	Analyte	Qualifier	Quality Control Exceedance
WP-1	Pentachlorophenol	U	Result < 5X EB-2 concentration
WC-8A	Pentachlorophenol	U @ RL	Result < 5X EB-2 concentration and < RL

2.3.3 Surrogate Analyses

Surrogate compounds were added to the samples, blanks, and QC samples as required. The recovery values are within the laboratory QC limits, with two exceptions.

- The surrogate recovery values of 2-fluorobiphenyl and p-terphenyl-d₁₄ for the SIM analysis of sample SP-1 were below the laboratory control limits with values of 22.7 and 17.0, indicating a potential low bias. Positive SIM results

are qualified as estimated (J) and undetected results are qualified as estimated detection limit (UJ), as shown below and in Section 5.

Sample ID	Analyte	Qualifier	Quality Control Exceedance
WP-1	PAHs (SIM)	J – Positive results UJ – Undetected results	Surrogate recovery < Laboratory control limits

2.3.4 Matrix Spike/Matrix Spike Duplicate Analyses

MS/MSD results for sample WCP-8 were reported for the full scan and SIM SVOCs as required in the SAP. The recovery and RPD values are within the laboratory control limits.

2.3.5 Laboratory Control Sample Analyses

LCS or LCS/LCSD results were reported as required for the full scan and SIM analyses. The recovery values are within the laboratory QC limits.

2.3.6 Laboratory Reporting Limits

The project-required limits were met by the reporting detection limit (RDL) or MDL for monitoring constituents in undiluted samples.

2.3.7 Field Duplicates

Four field duplicate pairs were collected with the samples: DUP-01/WC-11, DUP-02/WP-2, DUP-03/WC-56, and DUP-04/WC-57. RPD values less than or equal to 35 are considered acceptable precision for water samples. RPD values were not calculated for the field duplicate analysis for WC-11 and WP-2 because no semivolatile compounds were detected in either the sample or its duplicate. RPD values for the other samples are acceptable, with one exception.

- The fluoranthene RPD value for the field duplicate analysis of sample WC-56 is above the RPD criterion at 41 as shown in Table 2. The fluoranthene result for WC-56 and DUP-03 is qualified as estimated (J) due to the poor precision of the duplicate analysis, as shown below and in Section 5.
- The 2-methylnaphthalene RPD value for the field duplicate analysis of sample WC-57 is above the RPD criterion at 47 as shown in Table 2. The 2-methylnaphthalene result for WC-57 and DUP-04 is qualified as estimated (J) due to the poor precision of the duplicate analysis, as shown below and in Section 5.

Sample ID	Analyte	Qualifier	Quality Control Exceedance
WC-56	Fluoranthene	J	RPD value > QC criterion
DUP-03	Fluoranthene	J	RPD value > QC criterion
WC-57	2-methylnaphthalene	J	RPD value > QC criterion

Sample ID	Analyte	Qualifier	Quality Control Exceedance
DUP-04	2-methylnaphthalene	J	RPD value > QC criterion

2.3.8 Overall Assessment of Data Usability

Upon consideration of the information presented here, the data are acceptable as qualified for their intended use.

3.0 Data Qualifier Definitions

The following data validation qualifiers were used in the review of this data set. These qualifiers are from the *Contract Laboratory Program National Functional Guidelines for Organic Data Review*.

- U The analyte was analyzed for but not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a “tentative identification”.
- NJ The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the samples and meet quality control criteria. The presence or absence of the analyte cannot be verified.

4.0 References

Premier. 2010. Groundwater Monitoring Plan/Sampling and Analysis Plan, Wiggins Treated Wood Products Facility. Prepared for International Paper. Prepared by Premier Environmental Services. January 2010.

USEPA. 1996. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) Third Edition, Updates I, II, IIA, IIB, and III. United States Environmental Protection Agency. Office of Solid Waste. December 1996.

USEPA. 2008. Contract Laboratory Program National Functional Guidelines for Organic Data Review. U.S. Environmental Protection Agency Office of Emergency and Remedial Response. EPA540/R-99/008. June 2008.

5.0 Summary of Qualified Data

Listed below are the data qualified during the quality assurance review of this data set.

Sample ID	Analyte	Qualifier	Quality Control Exceedance
WP-1	Pentachlorophenol	U	Result < 5X EB-2 concentration
WC-8A	Pentachlorophenol	U @ RL	Result < 5X EB-2 concentration and < RL
WP-1	PAHs (SIM)	J – Positive results UJ – Undetected results	Surrogate recovery < Laboratory control limits
WC-56	Fluoranthene	J	RPD value > QC criterion
DUP-03	Fluoranthene	J	RPD value > QC criterion
WC-57	2-methylnaphthalene	J	RPD value > QC criterion
DUP-04	2-methylnaphthalene	J	RPD value > QC criterion

Table 2. Field Duplicate Precision

	WC-56	DUP-03	
Analyte	Result	Result	RPD
Fluoranthene	0.0000213	0.0000324	41
Phenanthrene	0.0000184	<0.0000180	NC
	WC-57	DUP-04	
Analyte	Result	Result	RPD
Carbazole	<0.000111	0.000144	NC
Dibenzofuran	0.00116	0.00152	27
Acenaphthene	0.00199	0.00165	19
Acenaphthylene	0.0000256	0.0000206	22
Benzo(b)fluoranthene	<0.0000168	0.0000170	NC
Fluoranthene	0.0000340	0.0000371	8.7
Fluorene	0.00105	0.000888	17
Naphthalene	0.0591	0.0417	35
Phenanthrene	0.000566	0.00040	34
Pyrene	<0.000169	0.0000397	NC
2-methylnaphthalene	0.00521	0.00323	47

Units – mg/L

RPD – Relative percent difference

NC – not calculated

Text and tables reviewed by: KJG 7/29/20



Environmental Challenges
BUSINESS SOLUTIONS®

EarthCon Plume Analytics® Services

Hazardous Waste Permit # HW-980-600-084

1633 South 1st Street
Wiggins, MS
International Paper

July 23, 2020

Groundwater Plume Analytics® Services

The material contained in this presentation, including text, graphic representations and the oral description thereof, is the sole and exclusive property of EarthCon Consultants, Inc. and is considered Proprietary and Confidential. This material, or any copy, facsimile, photograph or other reproduction of whatever kind, may not be disseminated to any third party without the express written consent of EarthCon Consultants, Inc.

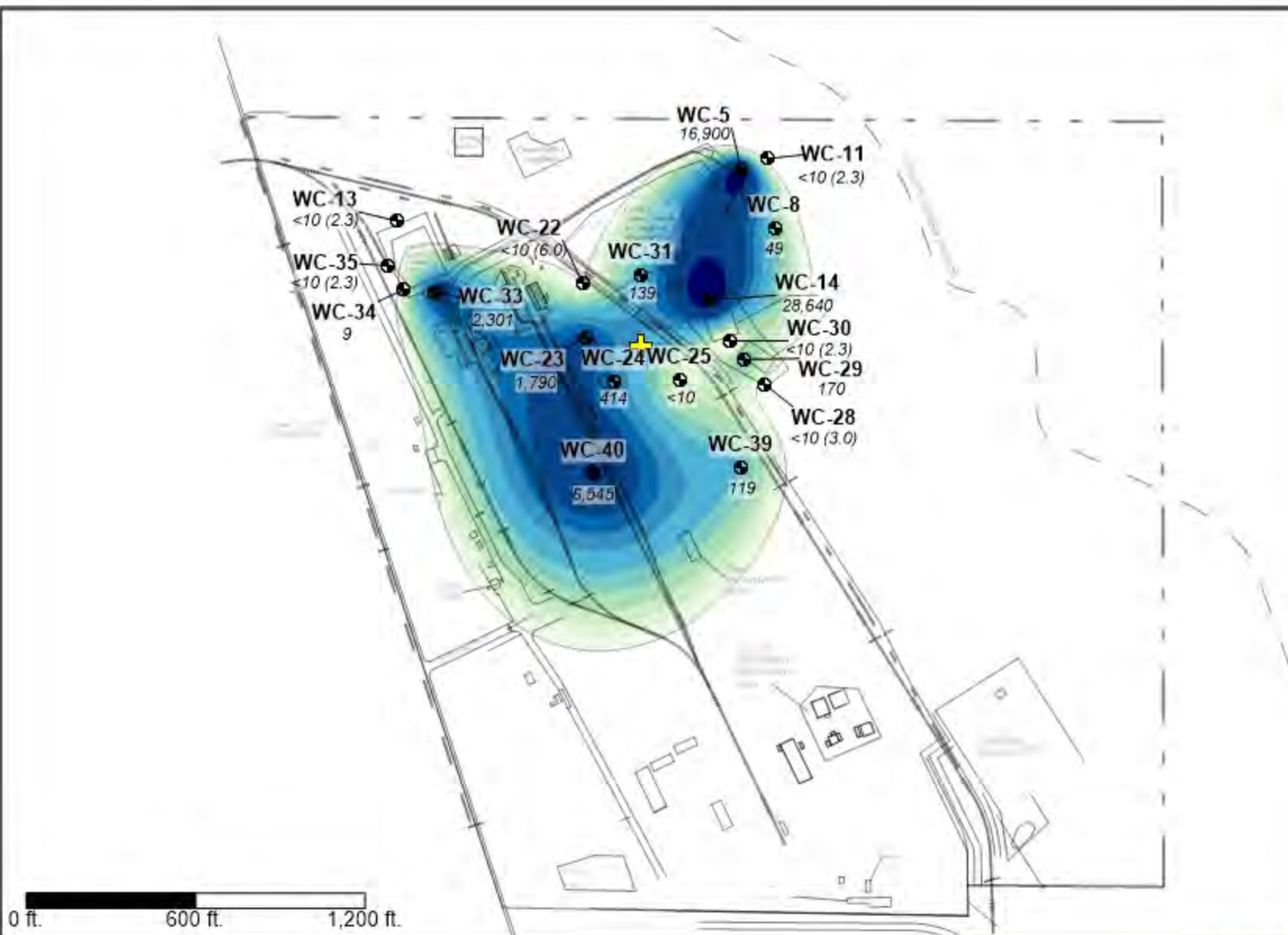
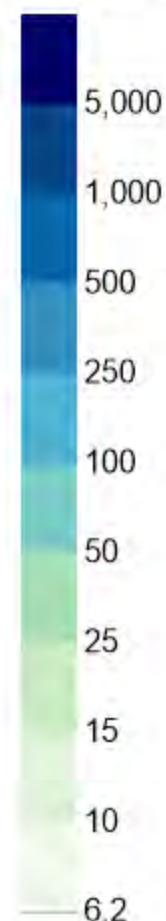
Groundwater Plume Analytics® Services

Naphthalene

Pentachlorophenol

Naphthalene 1991

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **42.5 acres**
Plume Average Concentration: **577 µg/L**
Plume Mass Indicator: **400 lbs**

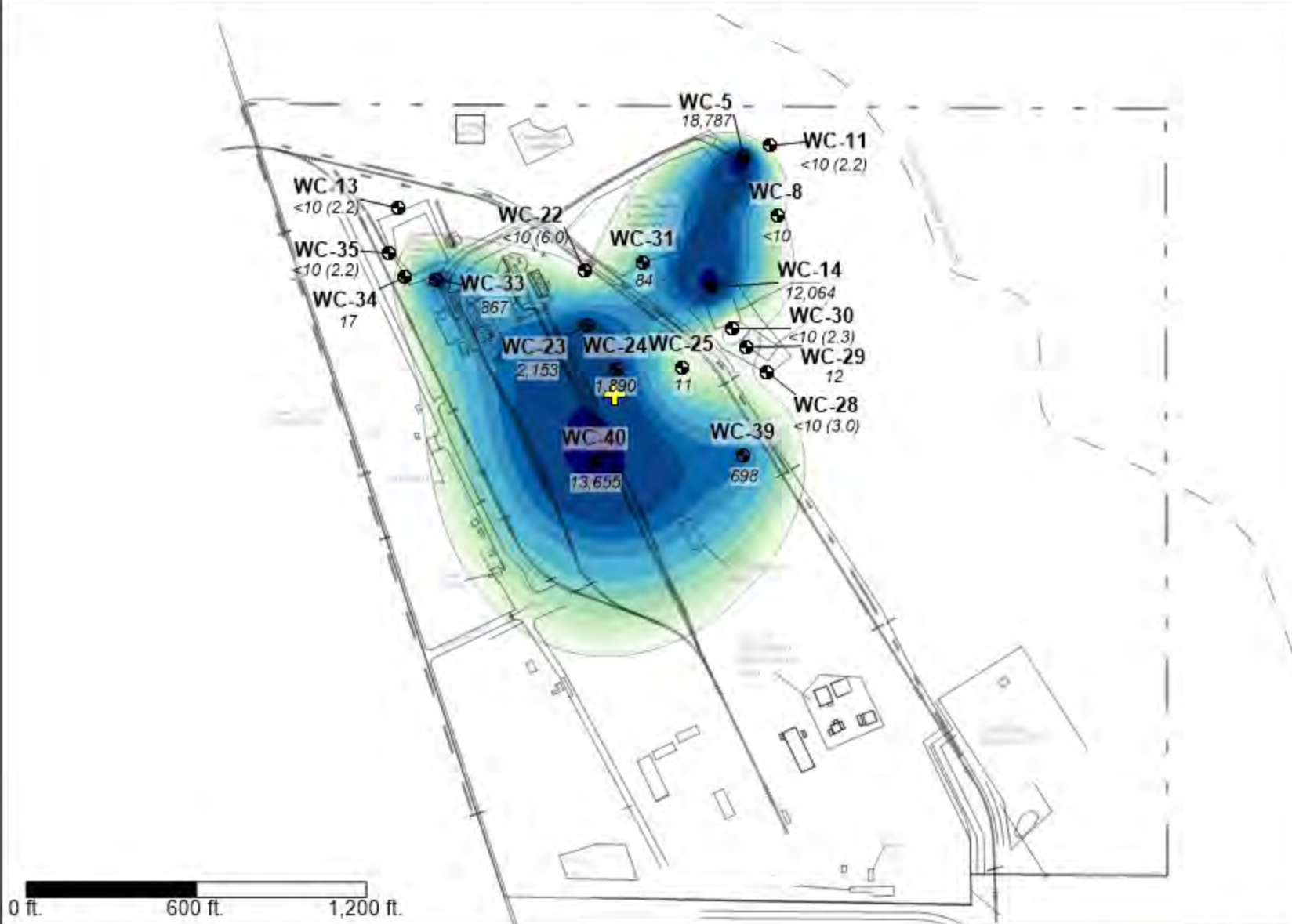
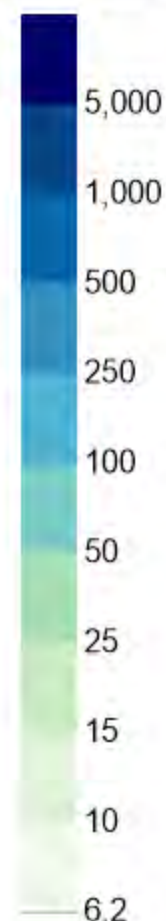
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene 1992

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **43.7 acres**
Plume Average Concentration: **740 µg/L**
Plume Mass Indicator: **528 lbs**

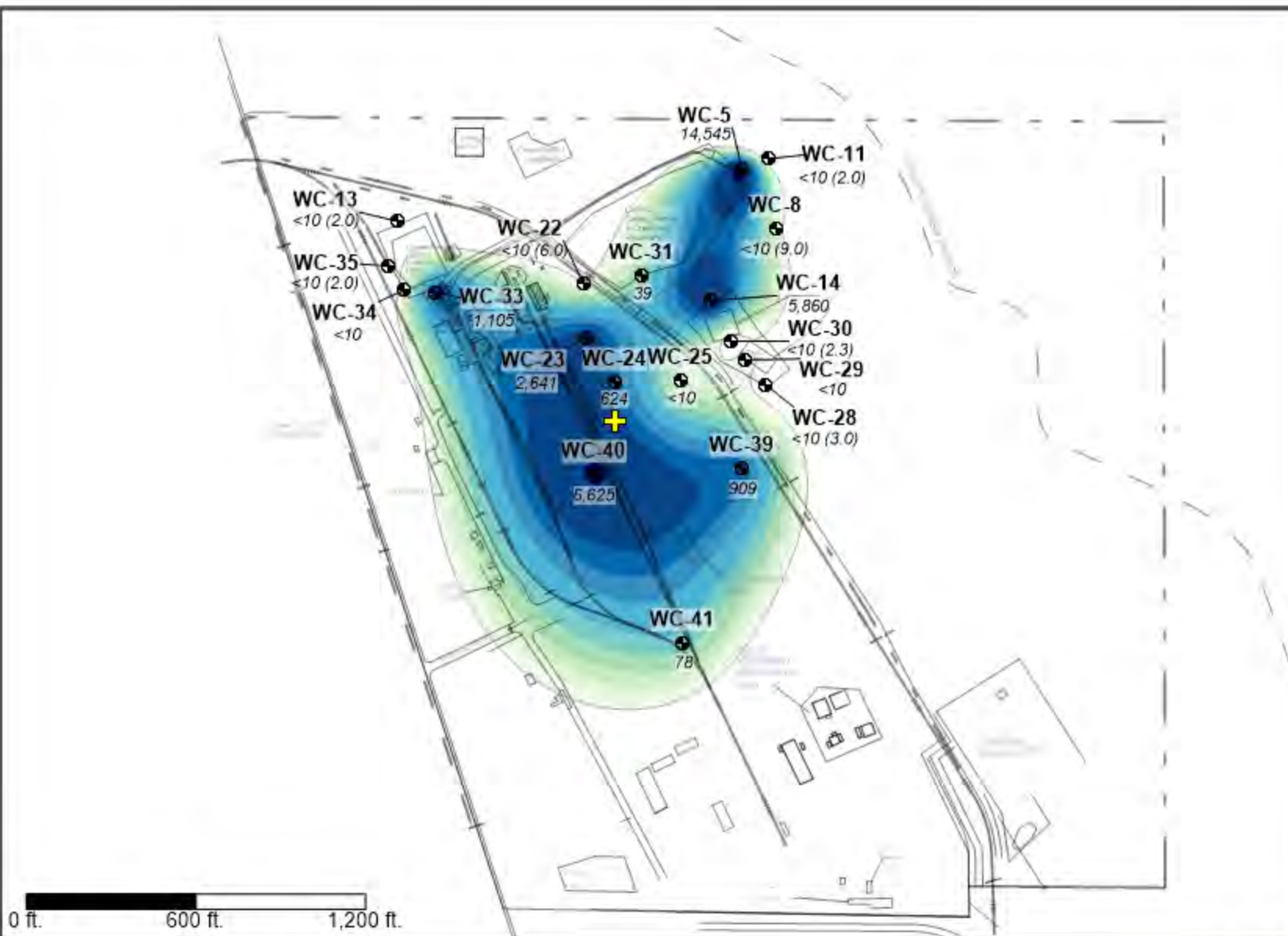
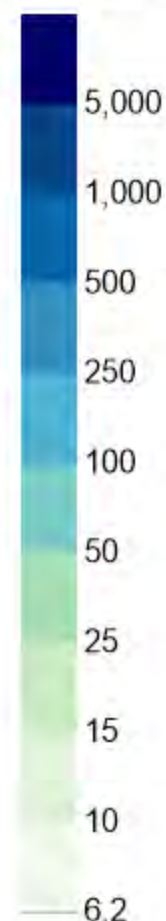
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Naphthalene 1993

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

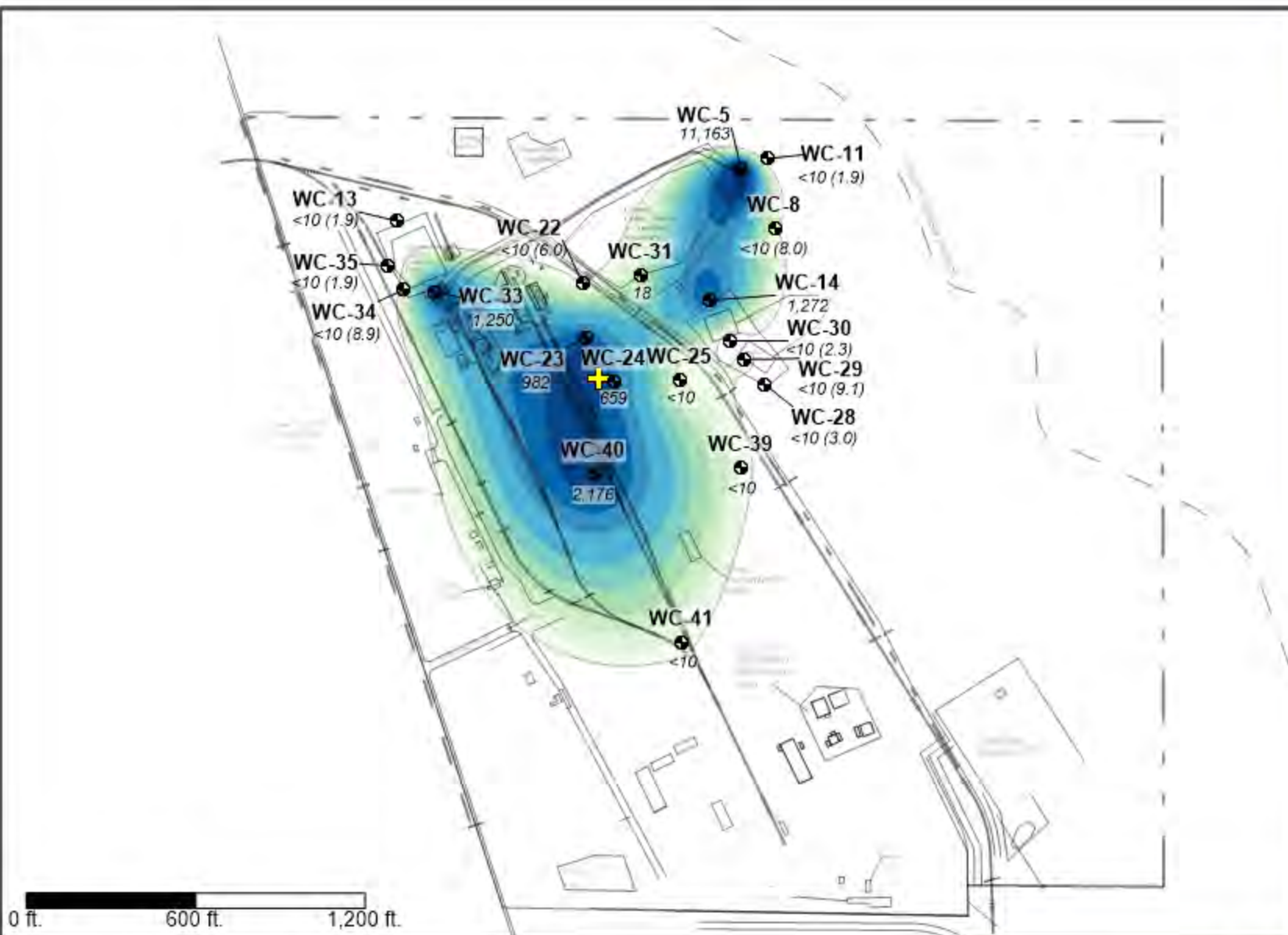
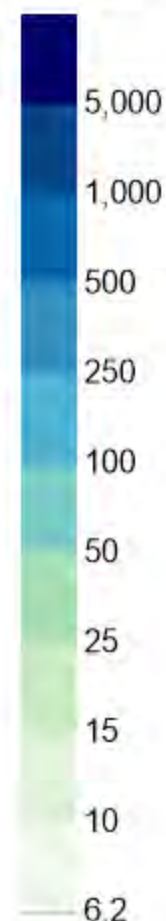
Plume Area: **46.9 acres**
 Plume Average Concentration: **500 µg/L**
 Plume Mass Indicator: **383 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Naphthalene 1994

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **38.9 acres**
 Plume Average Concentration: **242 µg/L**
 Plume Mass Indicator: **153 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

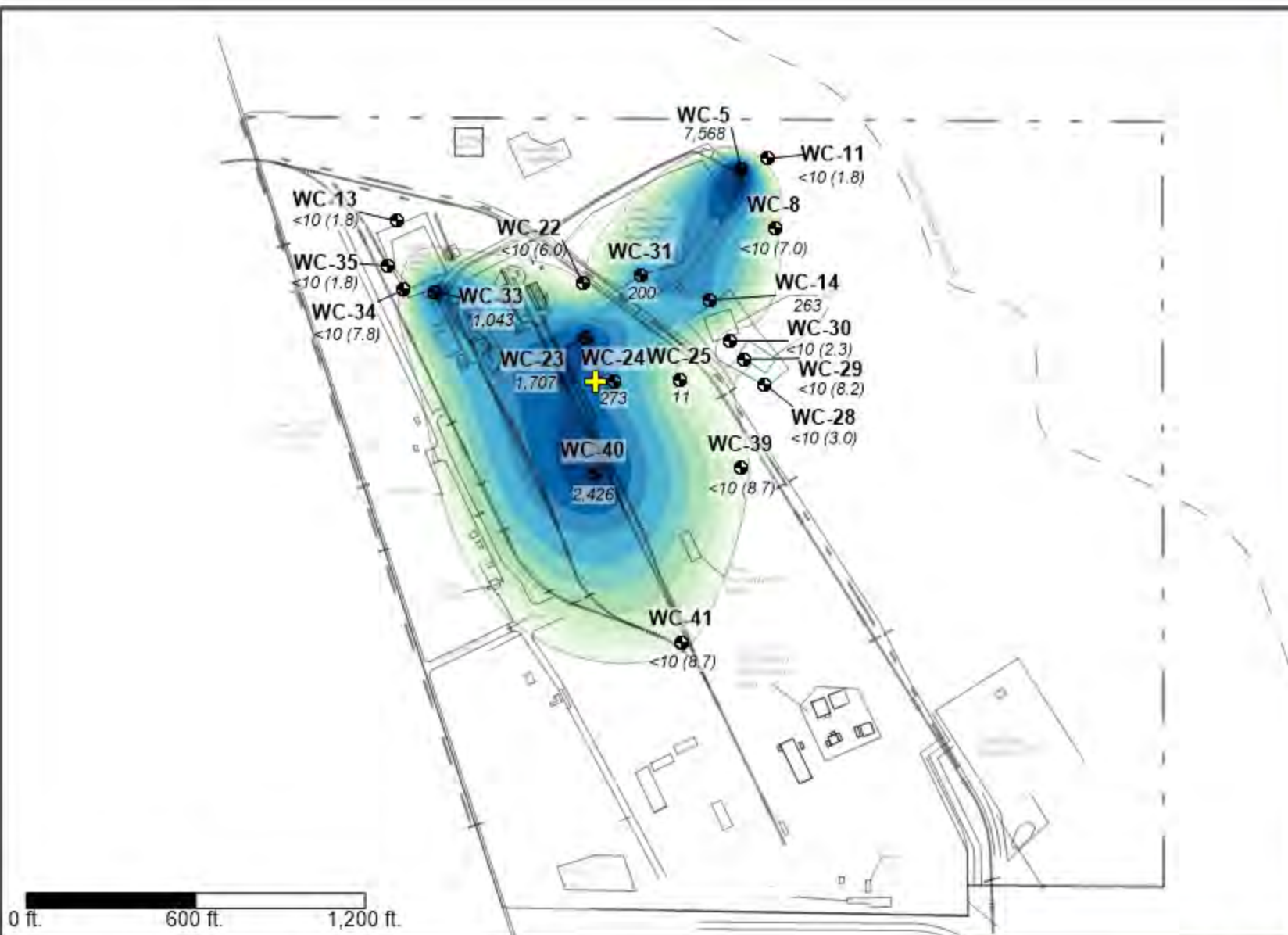
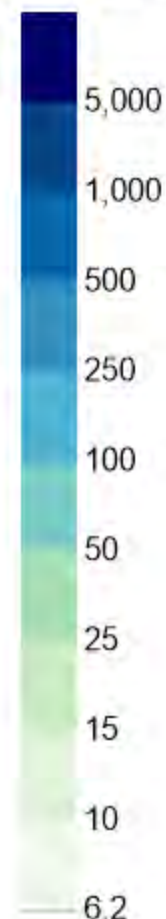


© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene

1995

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 38.7 acres
Plume Average Concentration: 223 µg/L
Plume Mass Indicator: 141 lbs

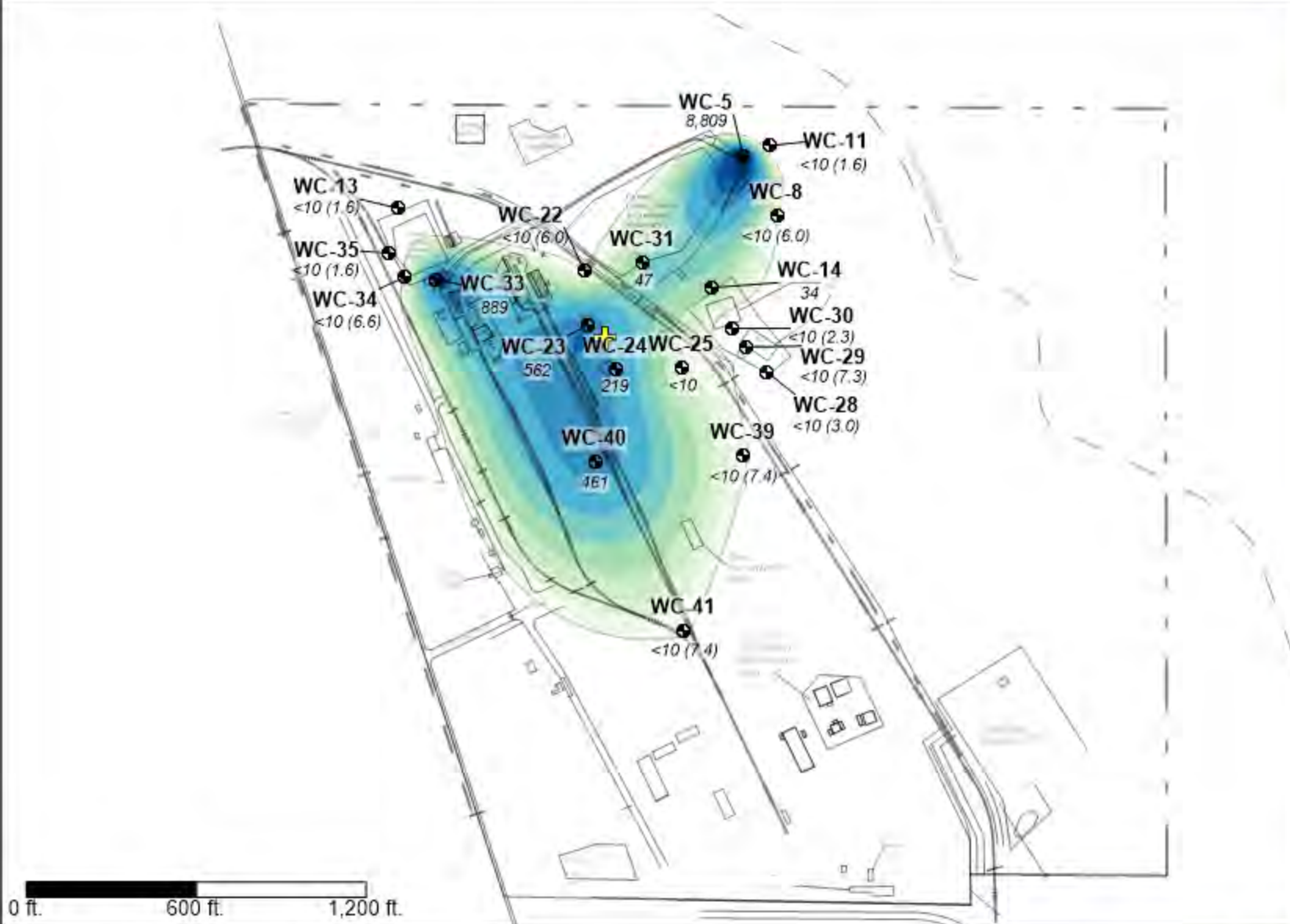
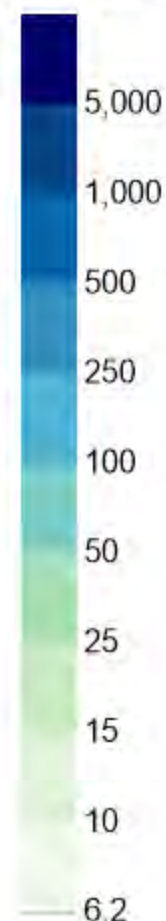
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges BUSINESS SOLUTIONS

Naphthalene 1996

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 35.3 acres
Plume Average Concentration: 112 µg/L
Plume Mass Indicator: 64.4 lbs

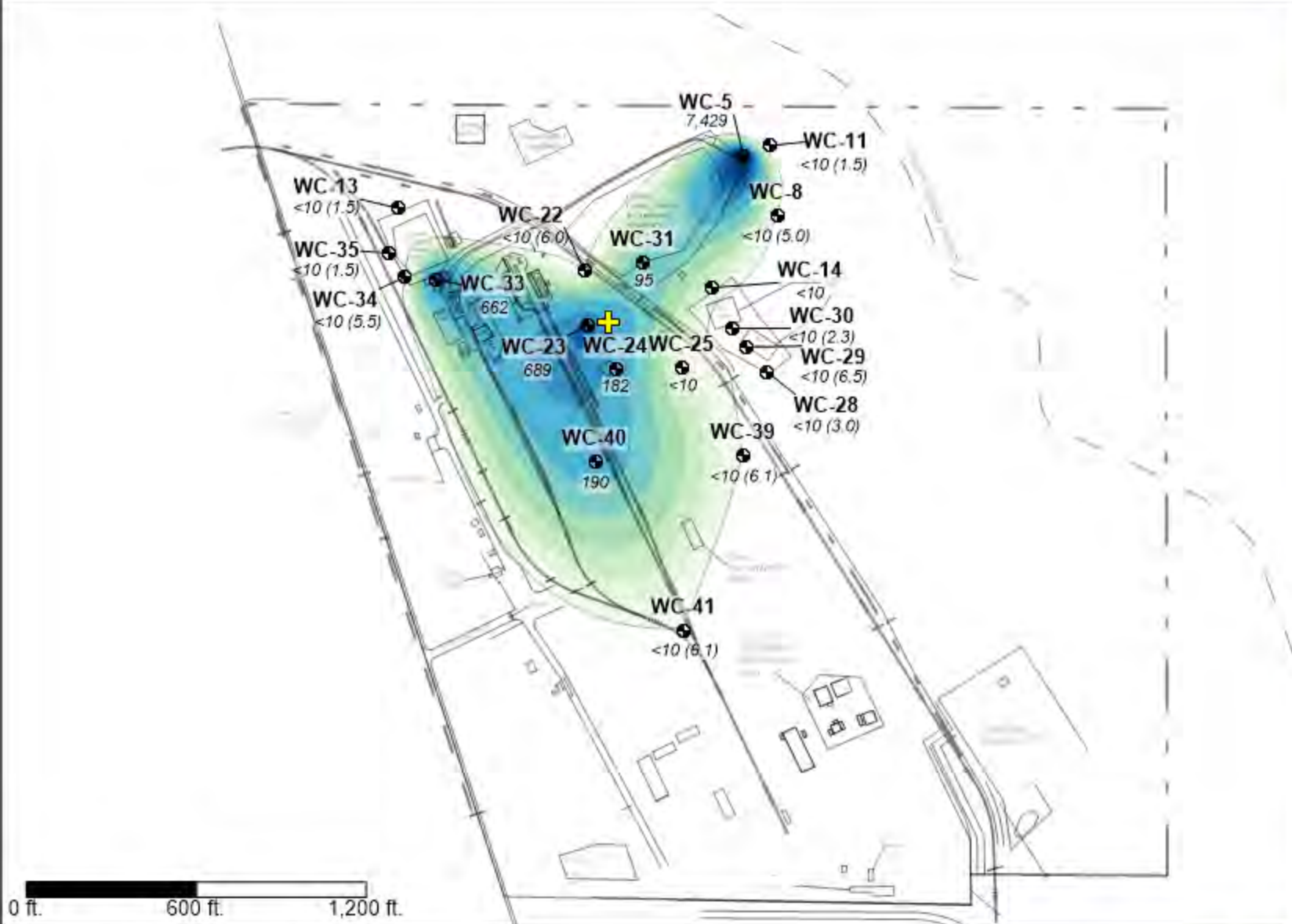
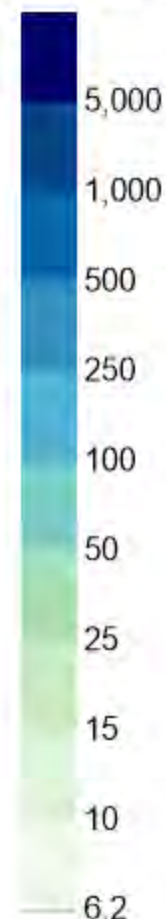
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **EARTHCON**
Environmental Challenges
BUSINESS SOLUTIONS

Naphthalene 1997

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **32.9 acres**
 Plume Average Concentration: **91.6 µg/L**
 Plume Mass Indicator: **49.2 lbs**

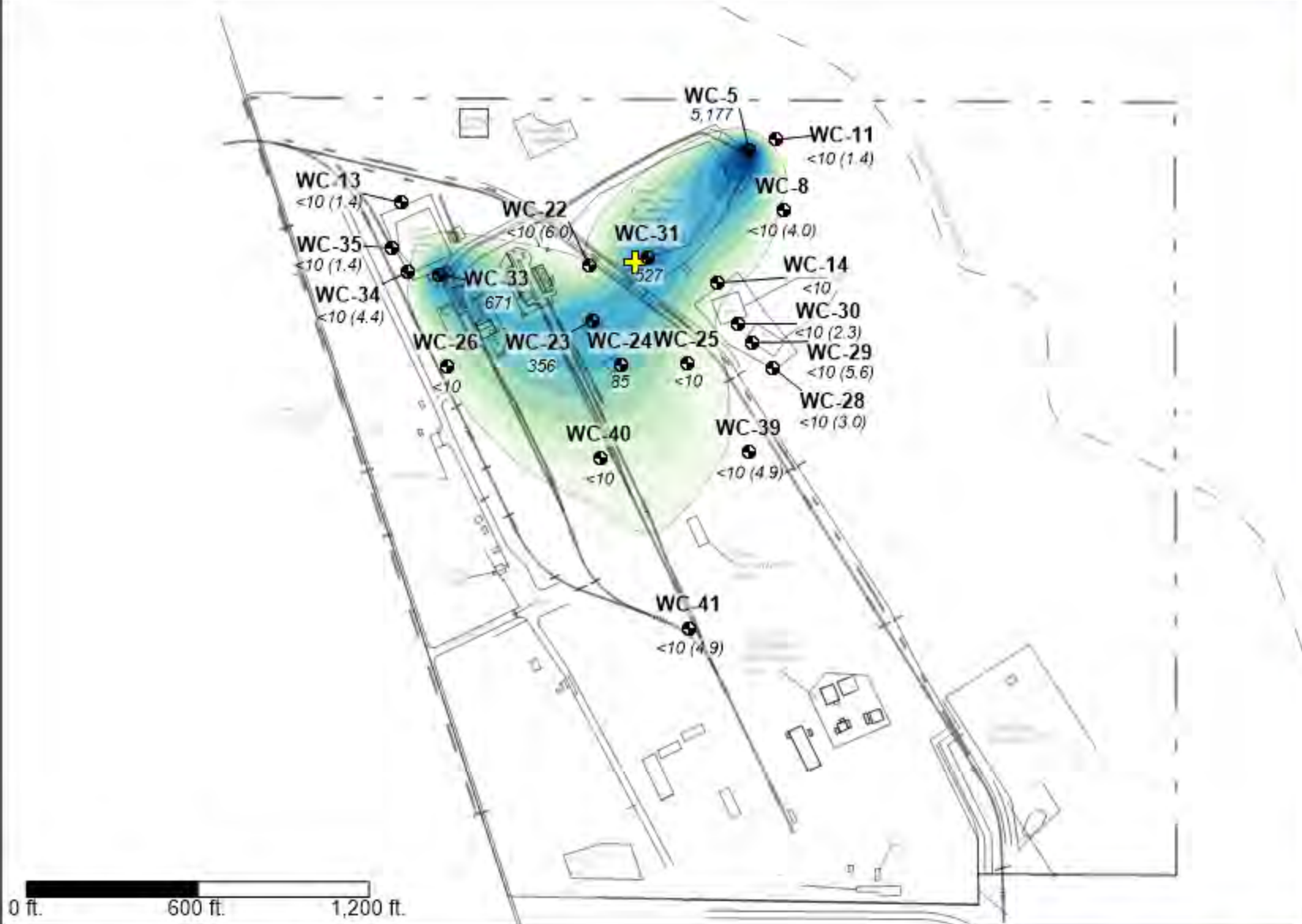
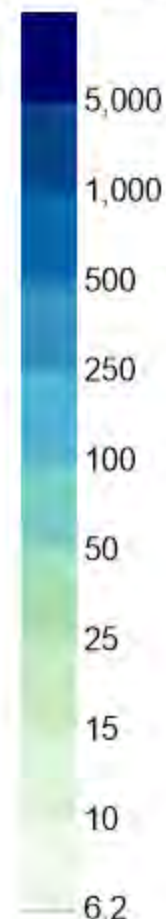
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS®

Naphthalene 1998

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **25.1 acres**
 Plume Average Concentration: **75.8 µg/L**
 Plume Mass Indicator: **31.0 lbs**

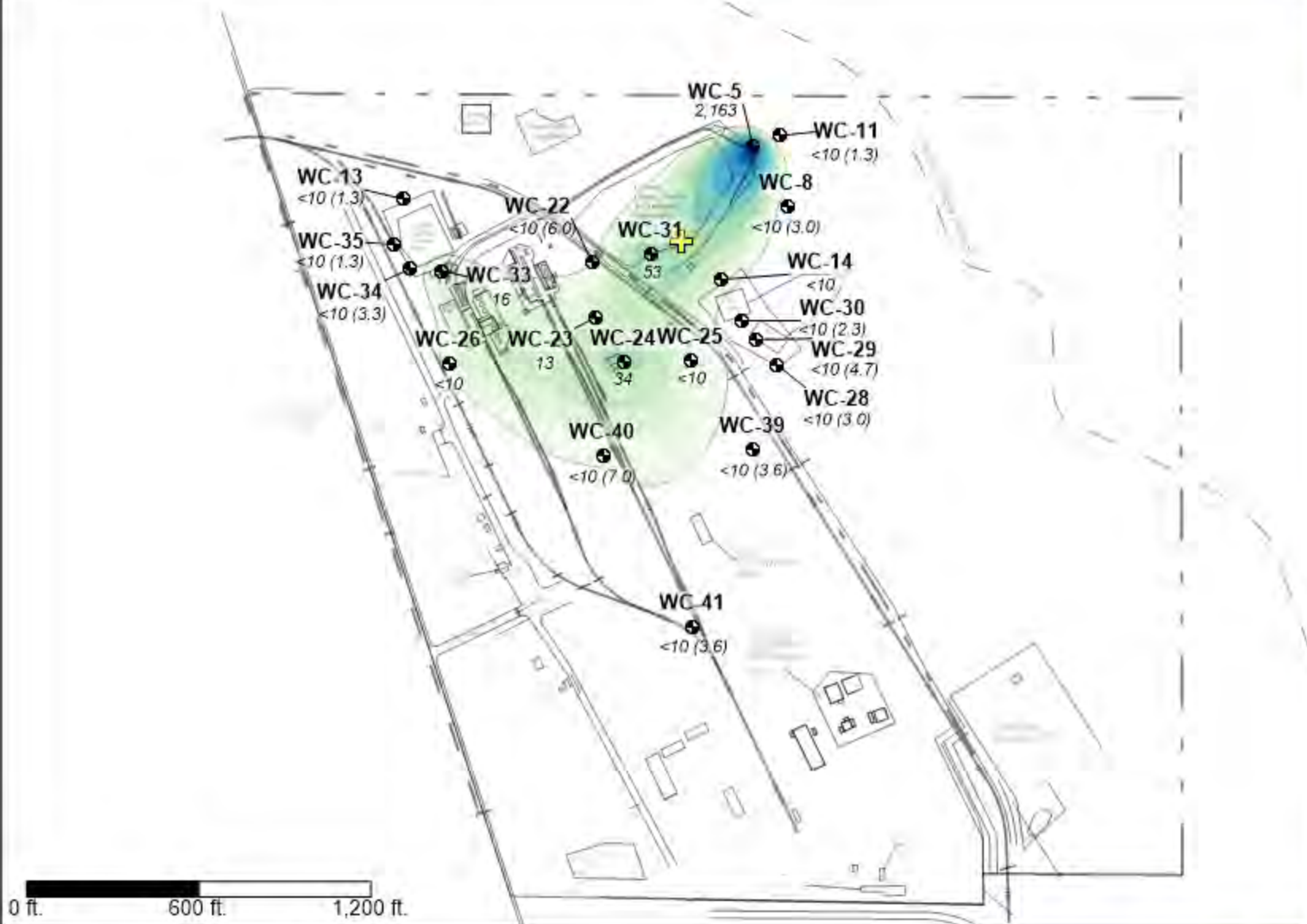
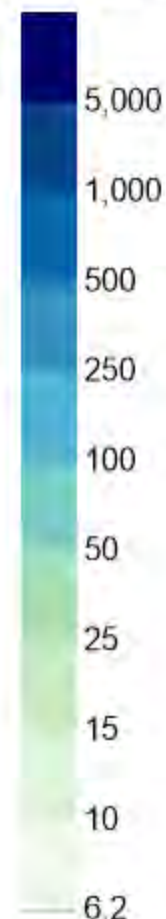
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Naphthalene 1999

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **19.9 acres**
 Plume Average Concentration: **28.1 µg/L**
 Plume Mass Indicator: **9.1 lbs**

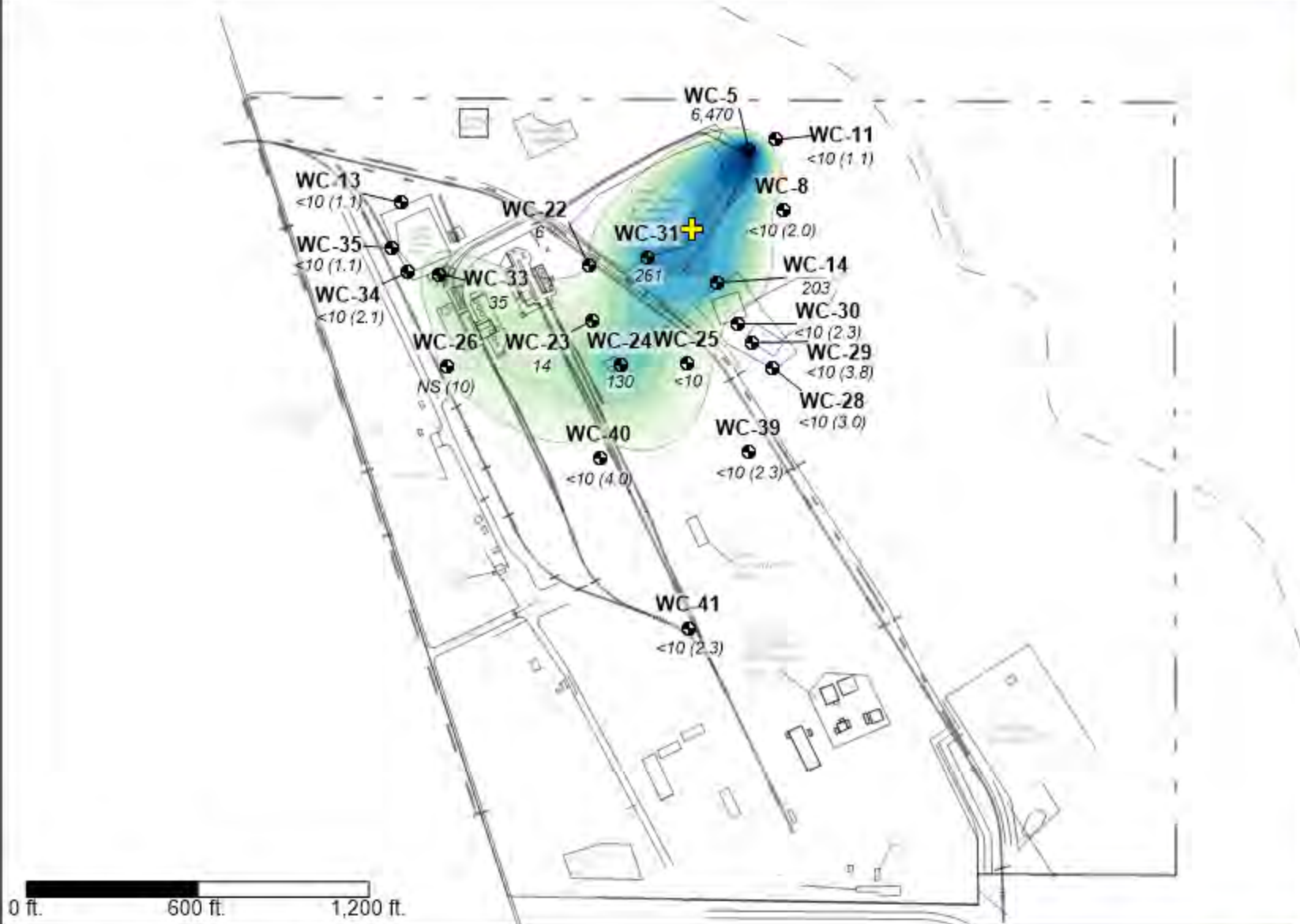
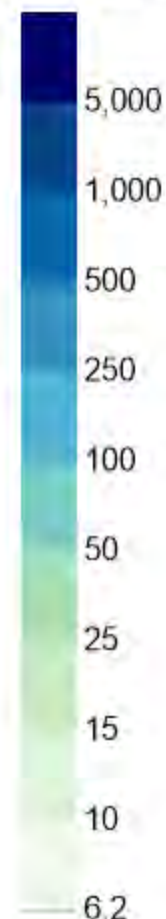
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene 2000

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 40 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

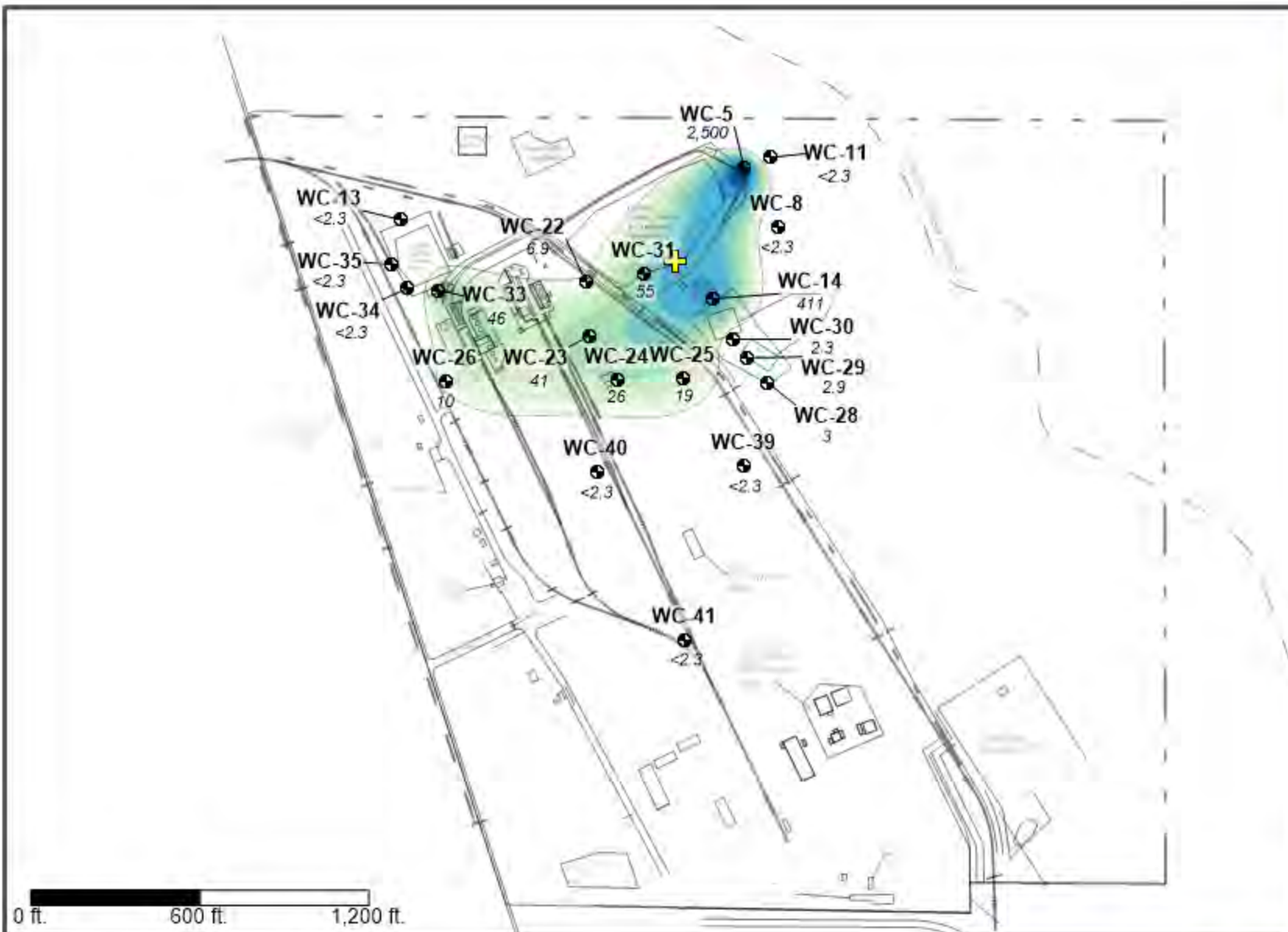
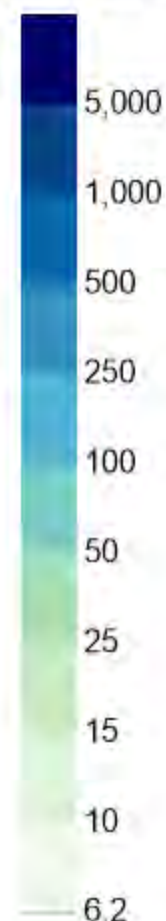
Plume Area: **19.4 acres**
Plume Average Concentration: **82.2 µg/L**
Plume Mass Indicator: **26.1 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Naphthalene 2001

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **16.8 acres**
Plume Average Concentration: **53.0 µg/L**
Plume Mass Indicator: **14.5 lbs**

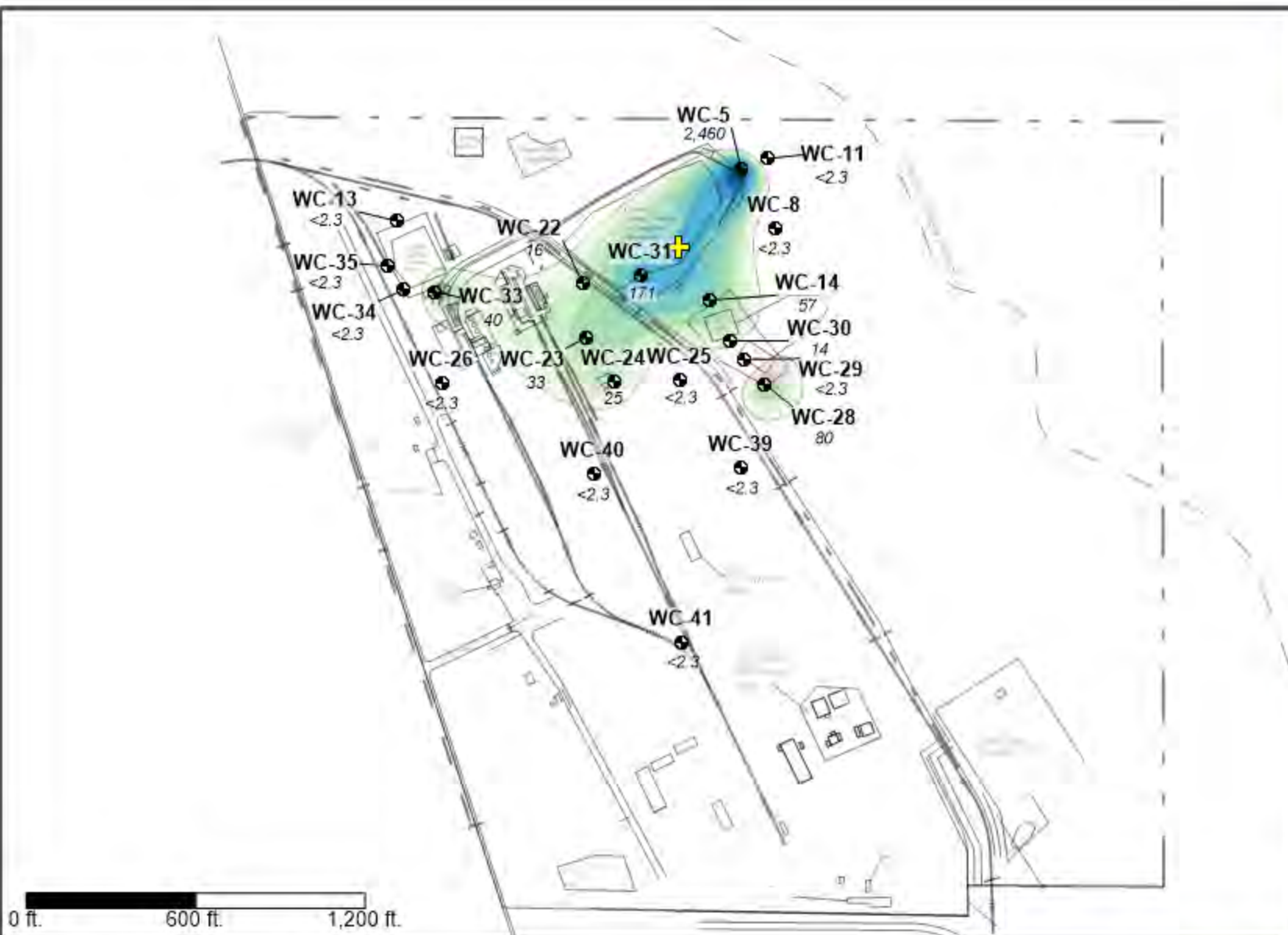
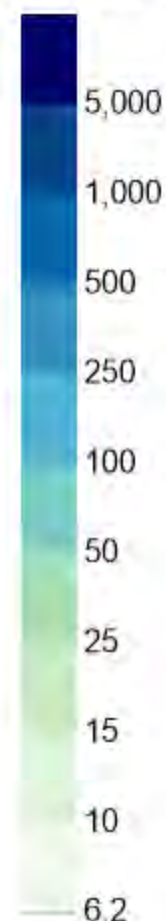
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges
BUSINESS SOLUTIONS

Naphthalene 2002

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 40 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **14.7 acres**
 Plume Average Concentration: **47.6 µg/L**
 Plume Mass Indicator: **11.4 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

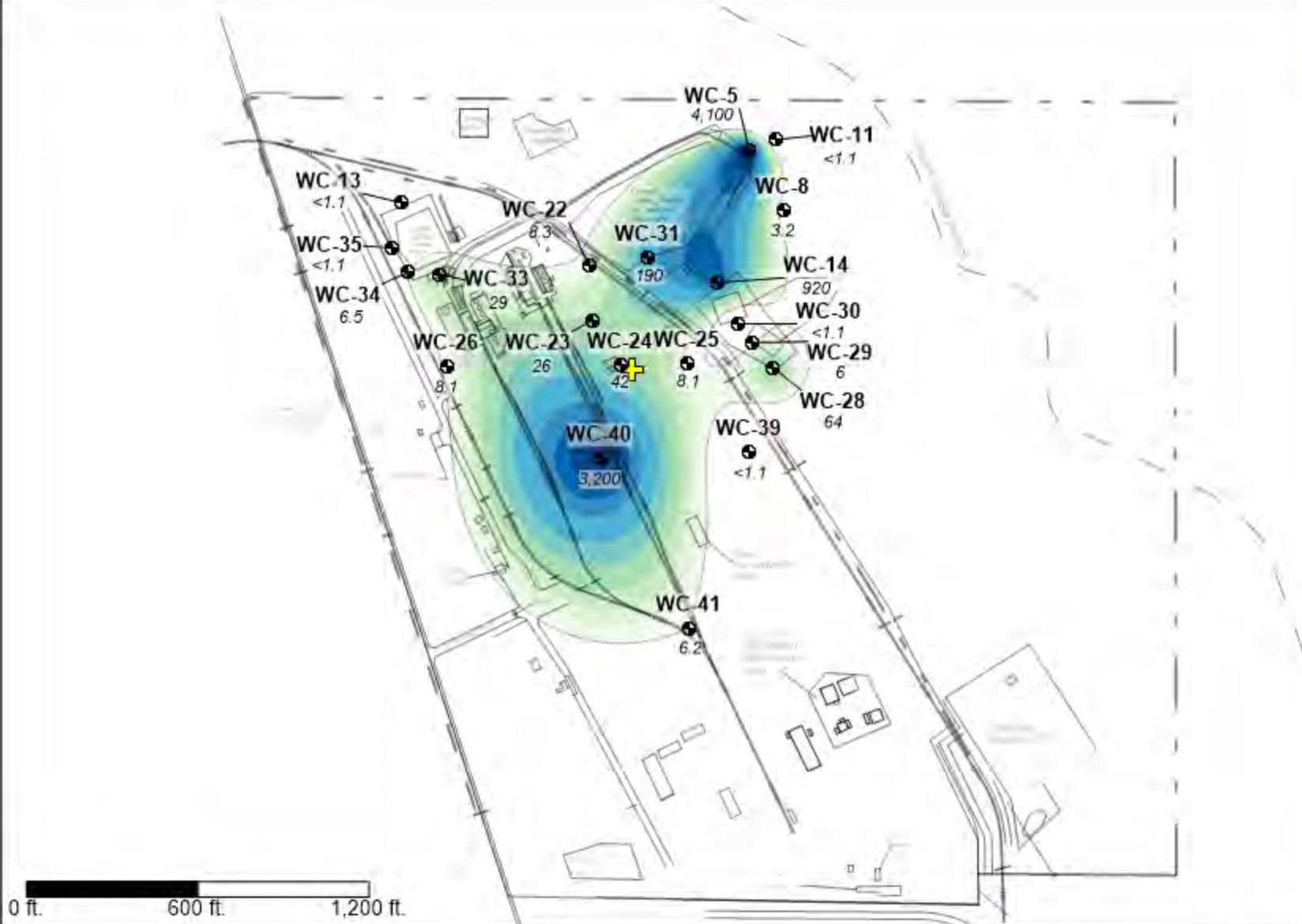
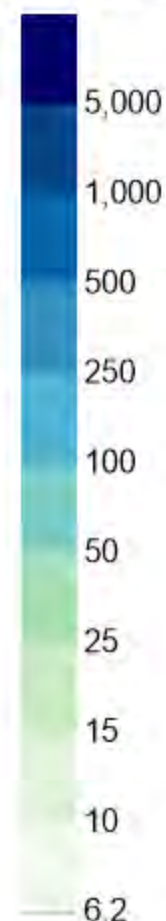


Environmental Challenges
 BUSINESS SOLUTIONS®

© EarthCon 2020

Naphthalene 2003

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **34.7 acres**
 Plume Average Concentration: **129 µg/L**
 Plume Mass Indicator: **73.1 lbs**

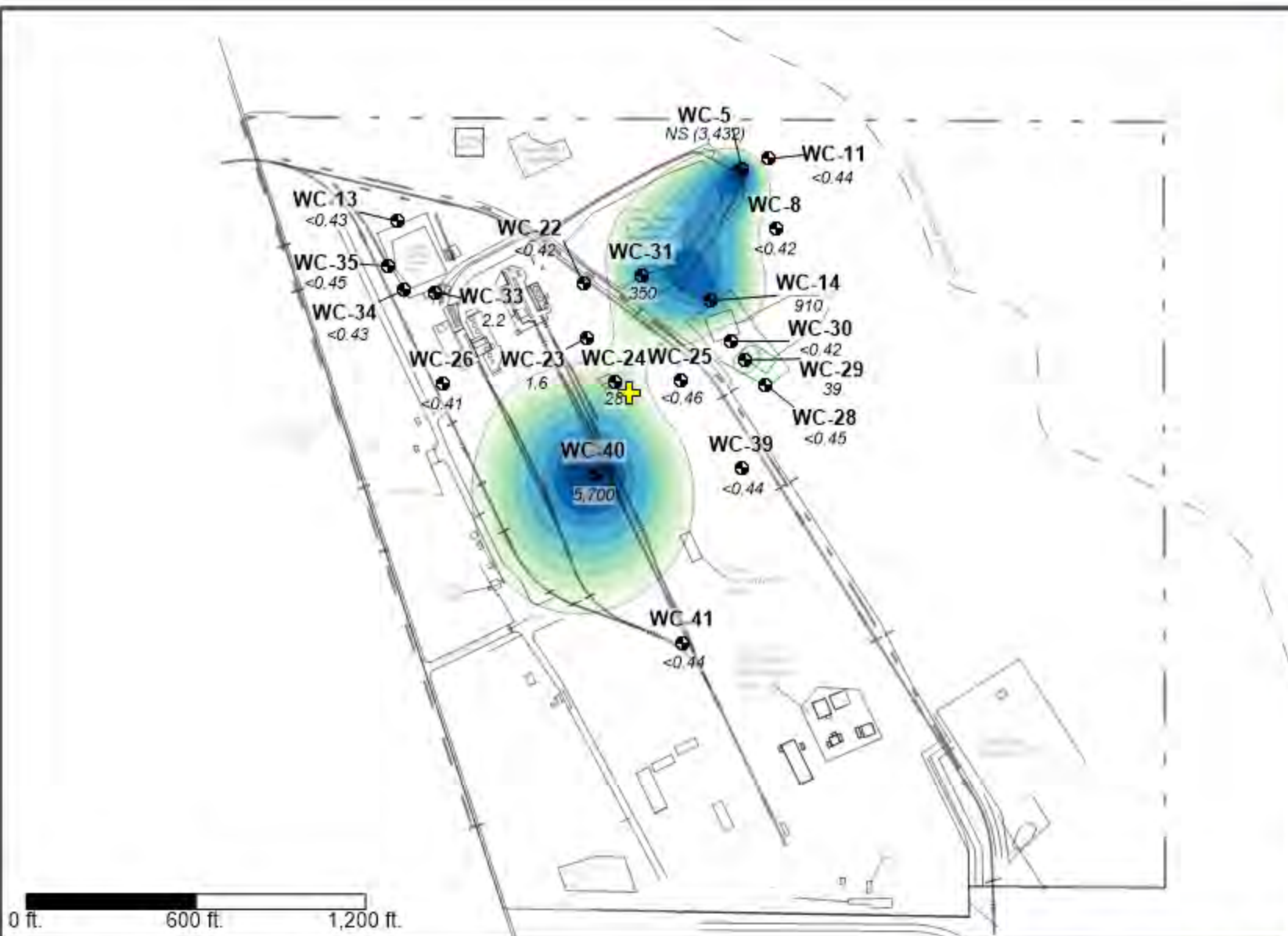
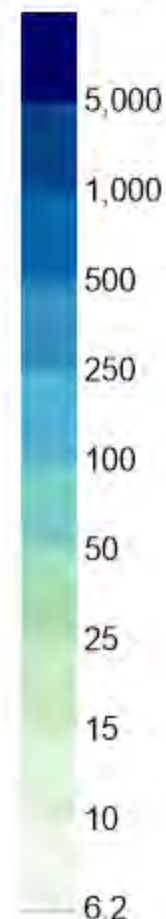
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS®

Naphthalene 2004

Concentration (µg/L)



- LEGEND**
- WC-8 Monitoring Well
 - 49 Concentration (µg/L)
 - NS (145) Well Not Sampled (Assigned Value Shown)
 - + Plume Center of Mass
 - ▲ 2007 ISCO Injection Point
 - ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **20.7 acres**
 Plume Average Concentration: **187 µg/L**
 Plume Mass Indicator: **63.1 lbs**

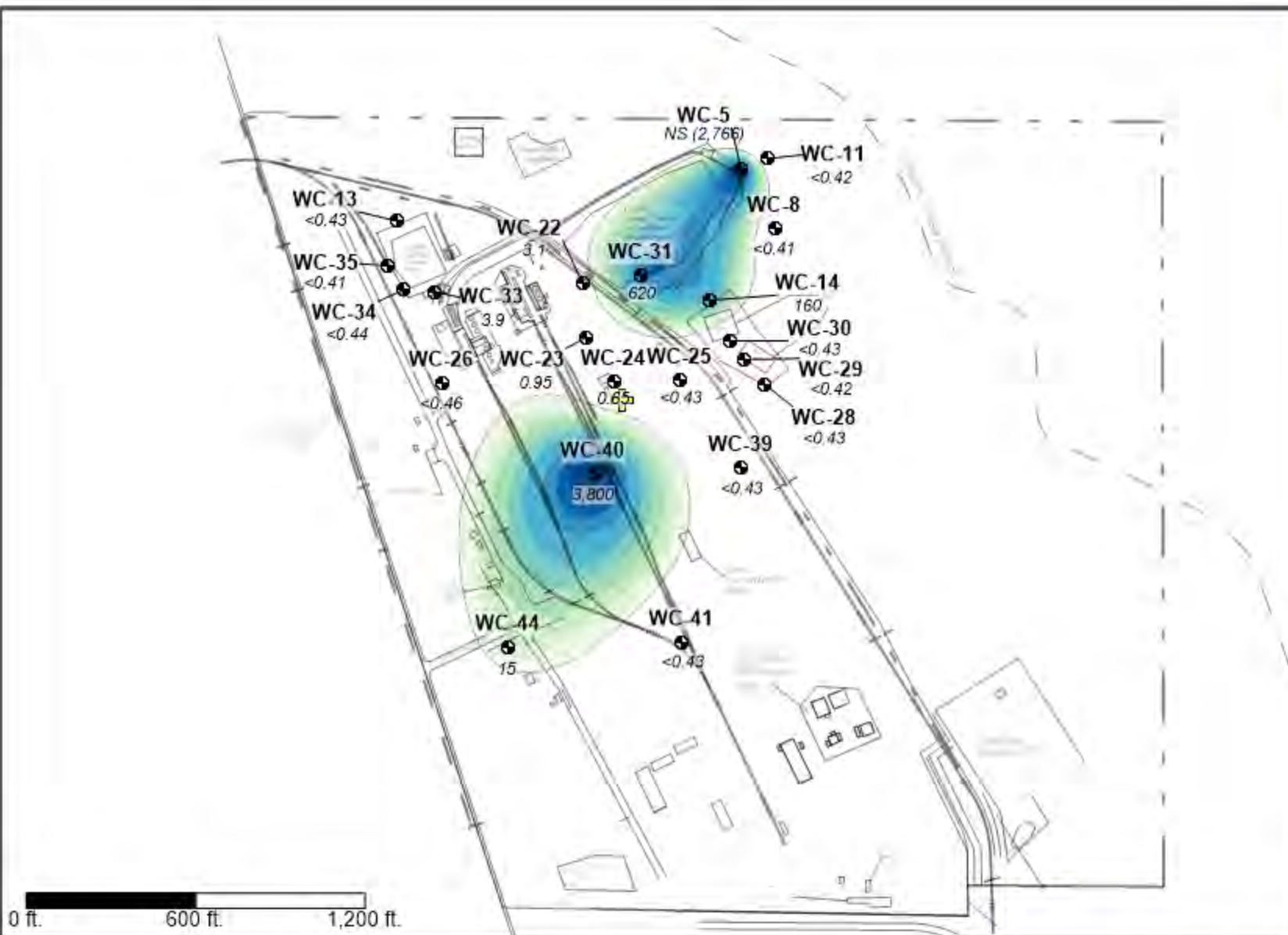
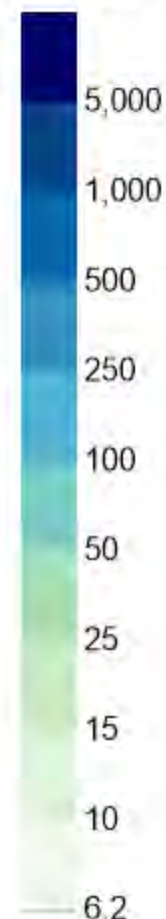
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene 2005

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (146) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **21.5 acres**
 Plume Average Concentration: **137 µg/L**
 Plume Mass Indicator: **48.0 lbs**

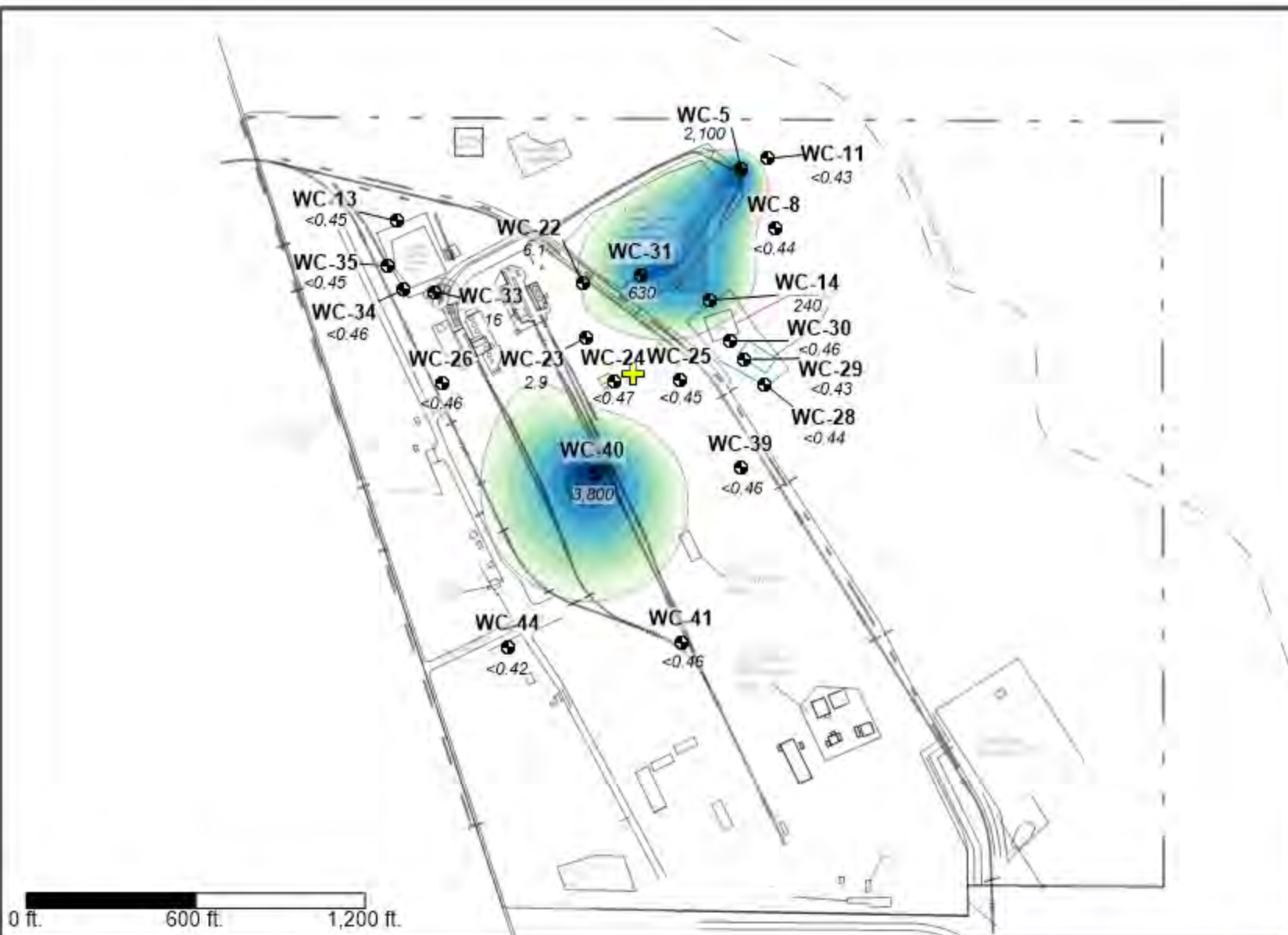
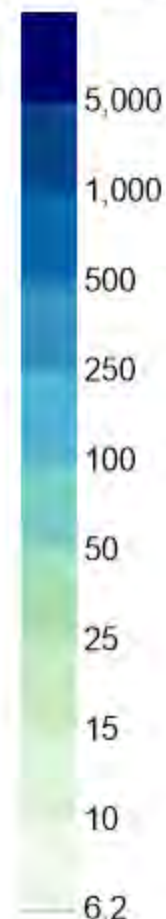
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Naphthalene 2006

Concentration (µg/L)



- LEGEND**
- WC-8 Monitoring Well
 - 49 Concentration (µg/L)
 - NS (145) Well Not Sampled (Assigned Value Shown)
 - + Plume Center of Mass
 - ▲ 2007 ISCO Injection Point
 - ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **18.0 acres**
 Plume Average Concentration: **137 µg/L**
 Plume Mass Indicator: **40.1 lbs**

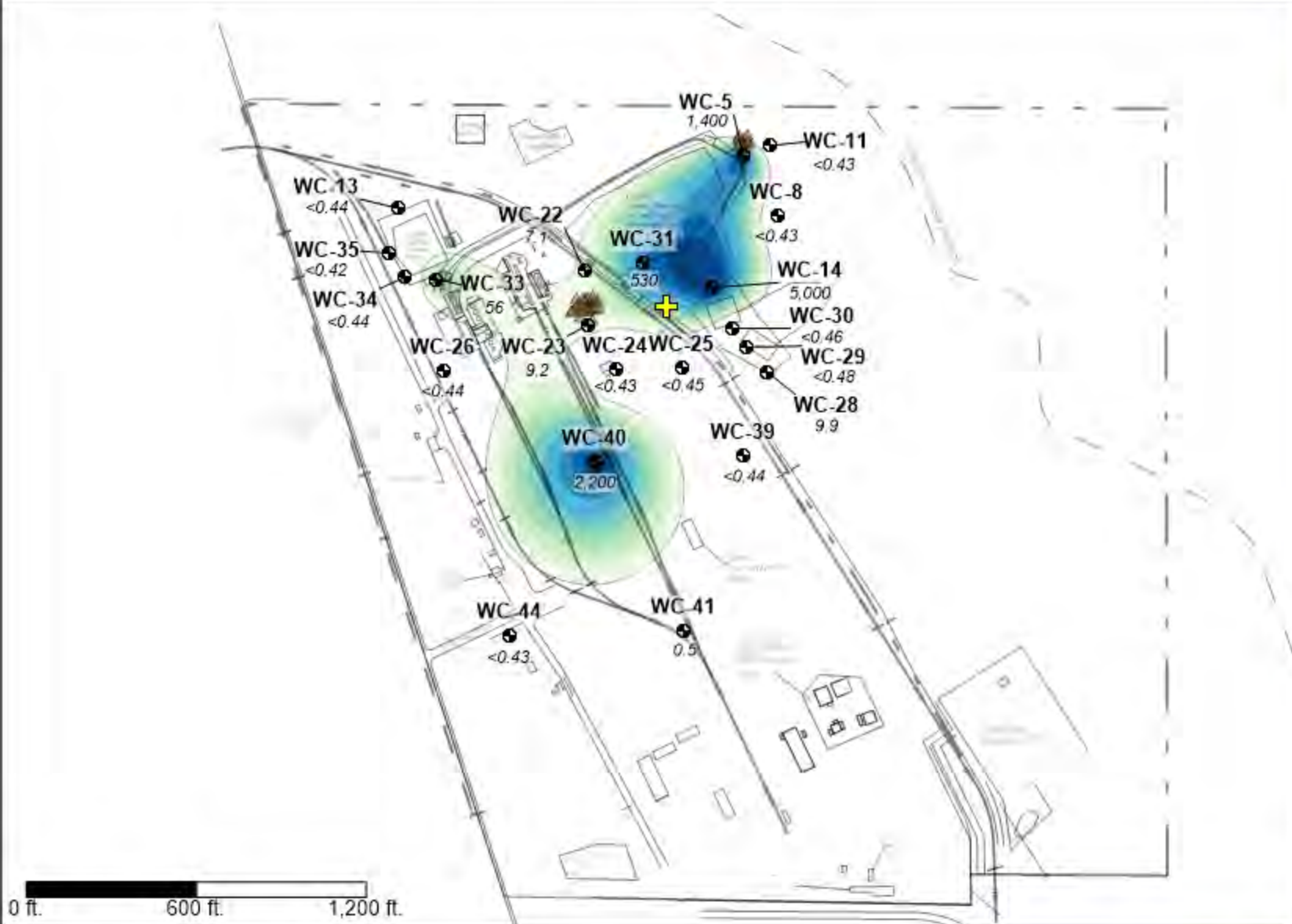
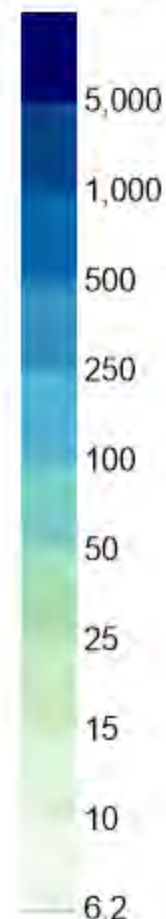
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Naphthalene 2007

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **21.4 acres**
 Plume Average Concentration: **164 µg/L**
 Plume Mass Indicator: **57.3 lbs**

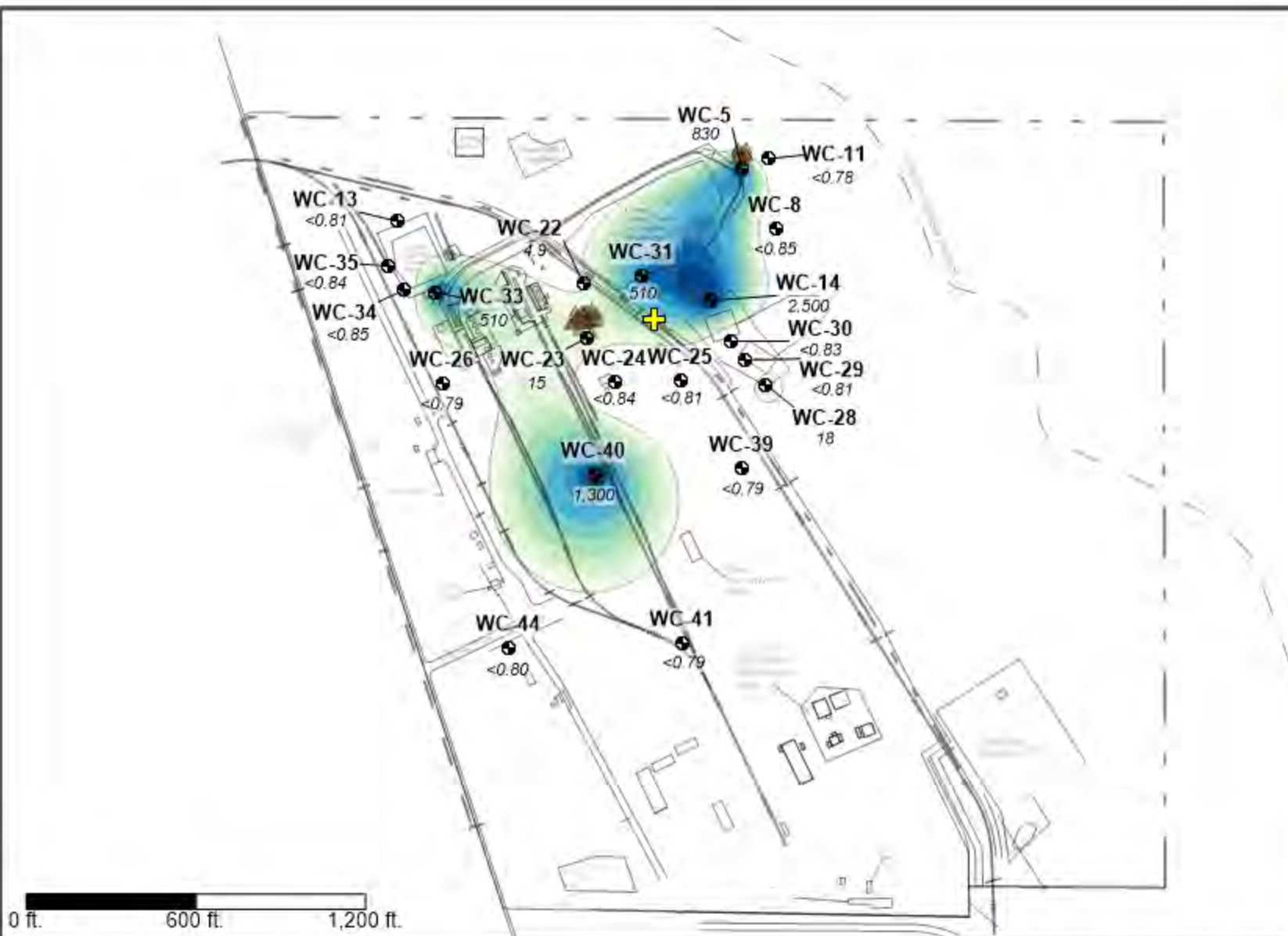
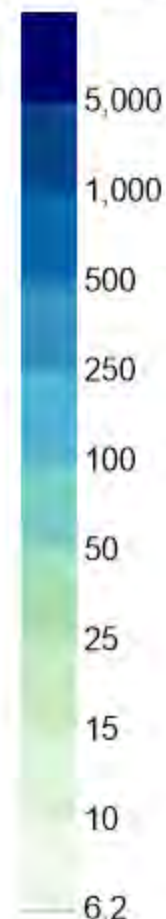
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS®

Naphthalene 2008

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 22.1 acres
Plume Average Concentration: 112 µg/L
Plume Mass Indicator: 40.3 lbs

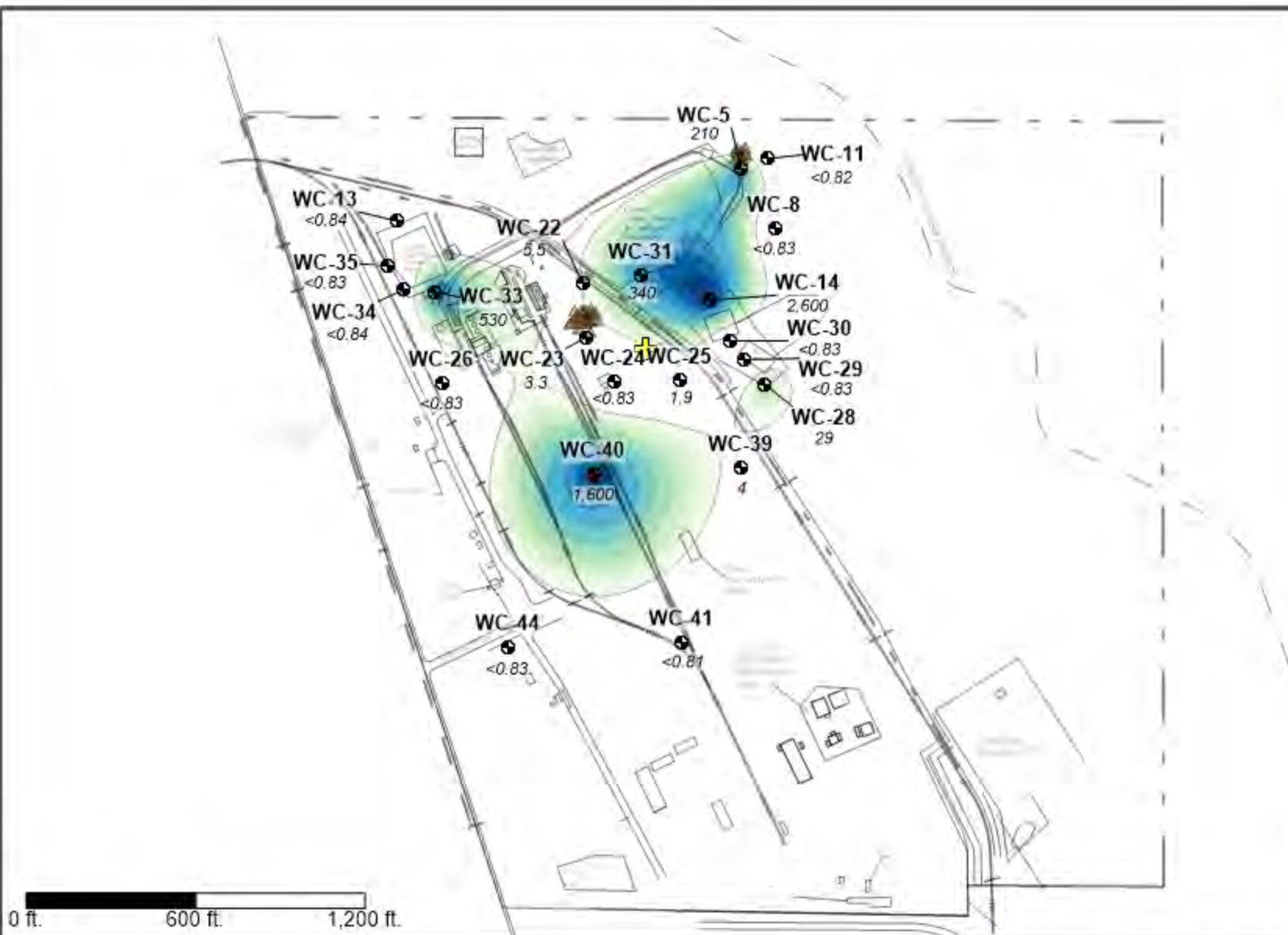
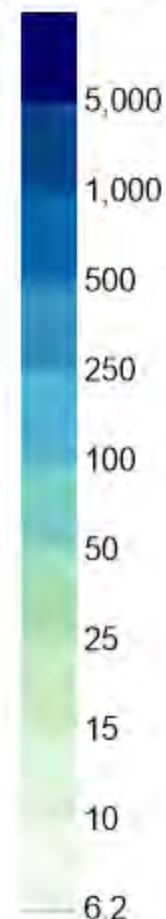
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Naphthalene 2009

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 22.5 acres
Plume Average Concentration: 98.2 µg/L
Plume Mass Indicator: 36.0 lbs

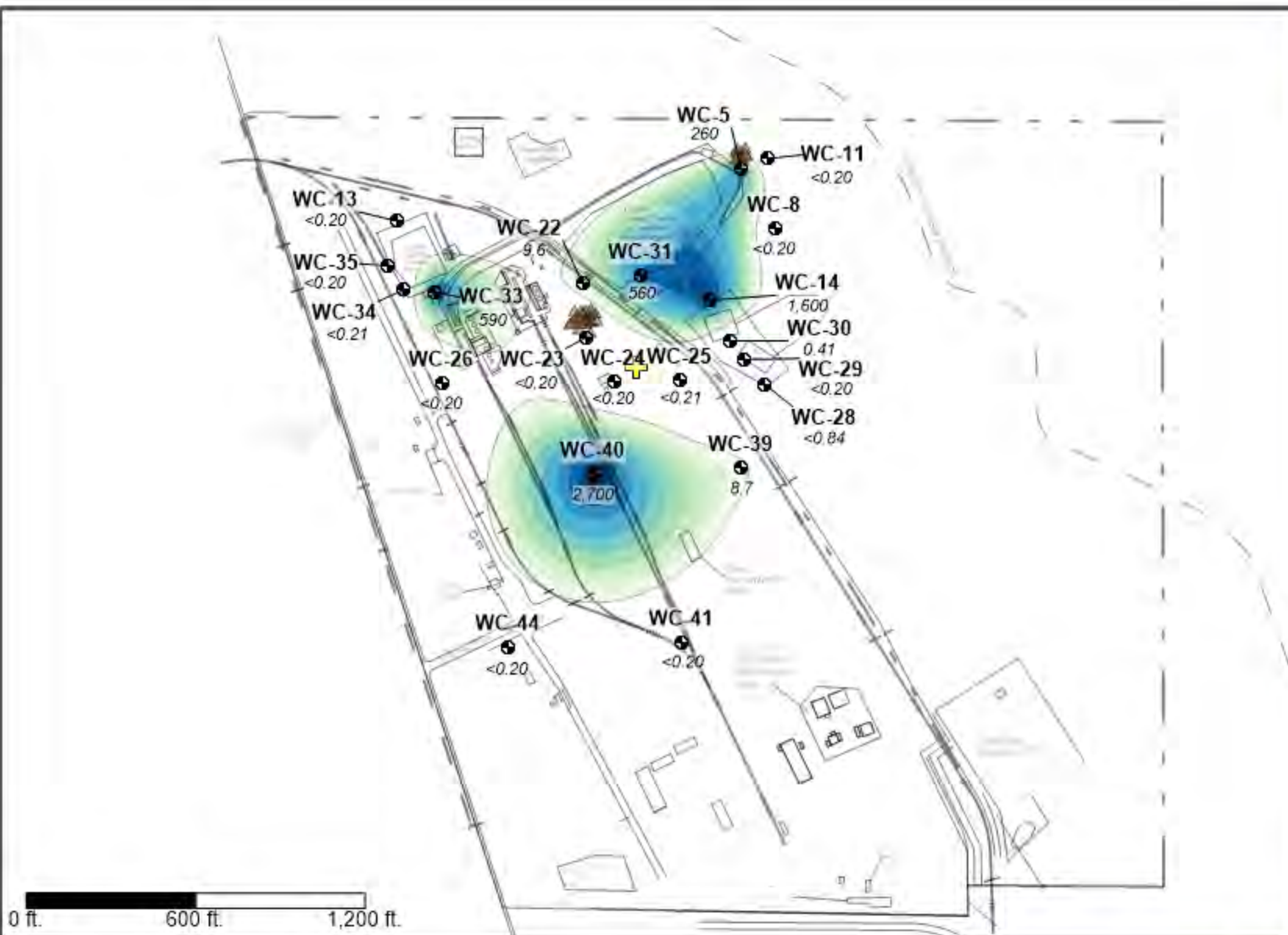
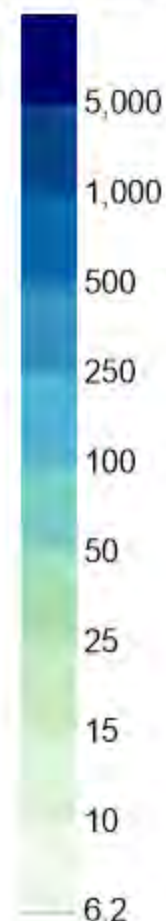
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges
BUSINESS SOLUTIONS

Naphthalene 2010

Concentration (µg/L)



- LEGEND**
- WC-8 Monitoring Well
 - 49 Concentration (µg/L)
 - NS (145) Well Not Sampled (Assigned Value Shown)
 - + Plume Center of Mass
 - ▲ 2007 ISCO Injection Point
 - ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **21.7 acres**
 Plume Average Concentration: **120 µg/L**
 Plume Mass Indicator: **42.6 lbs**

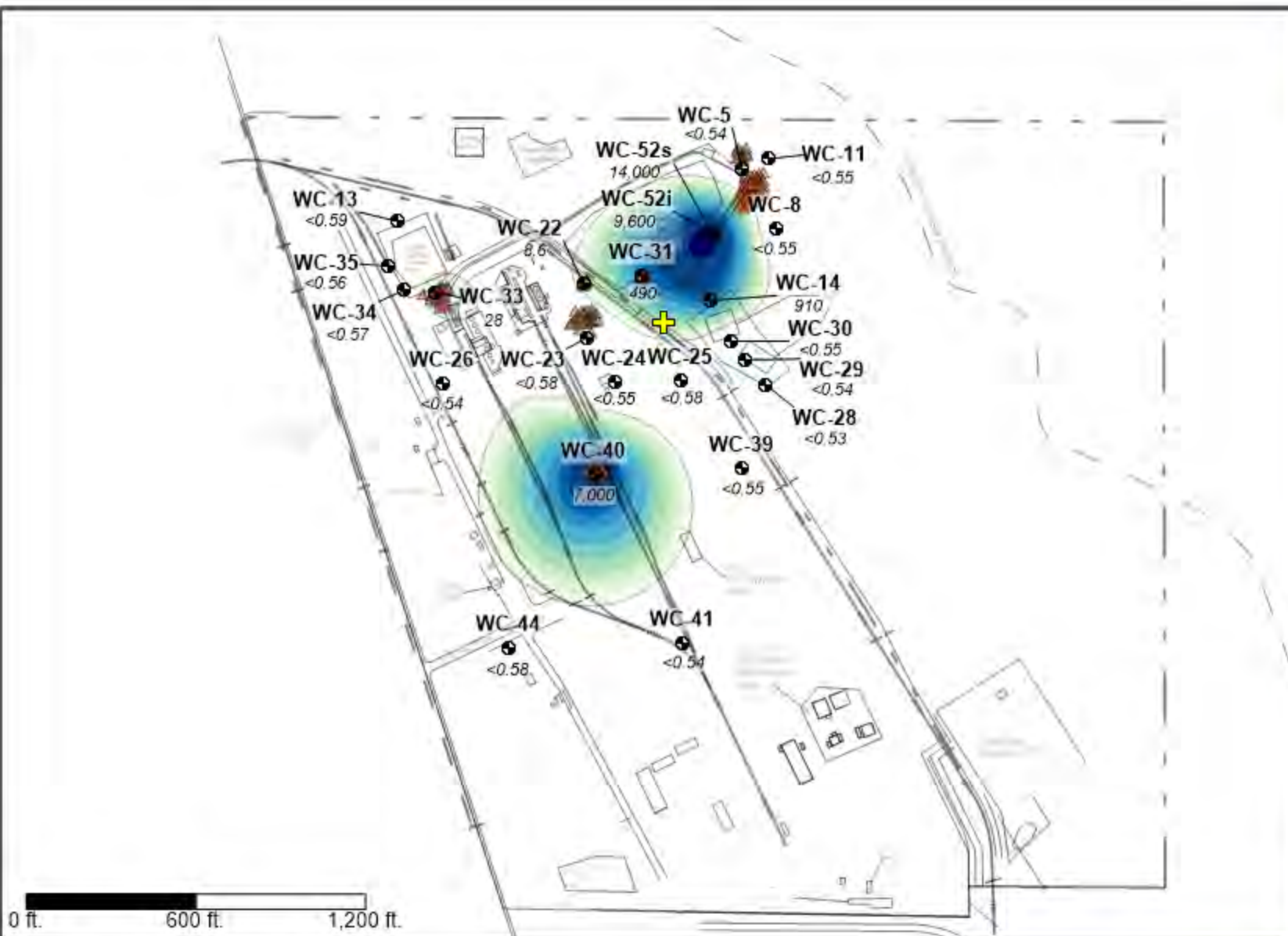
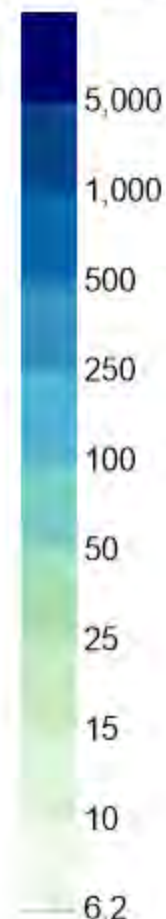
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges
BUSINESS SOLUTIONS**

Naphthalene 2011

Concentration (µg/L)



- LEGEND**
- WC-8 Monitoring Well
 - 49 Concentration (µg/L)
 - NS (145) Well Not Sampled (Assigned Value Shown)
 - + Plume Center of Mass
 - ▲ 2007 ISCO Injection Point
 - ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **17.9 acres**
 Plume Average Concentration: **389 µg/L**
 Plume Mass Indicator: **113 lbs**

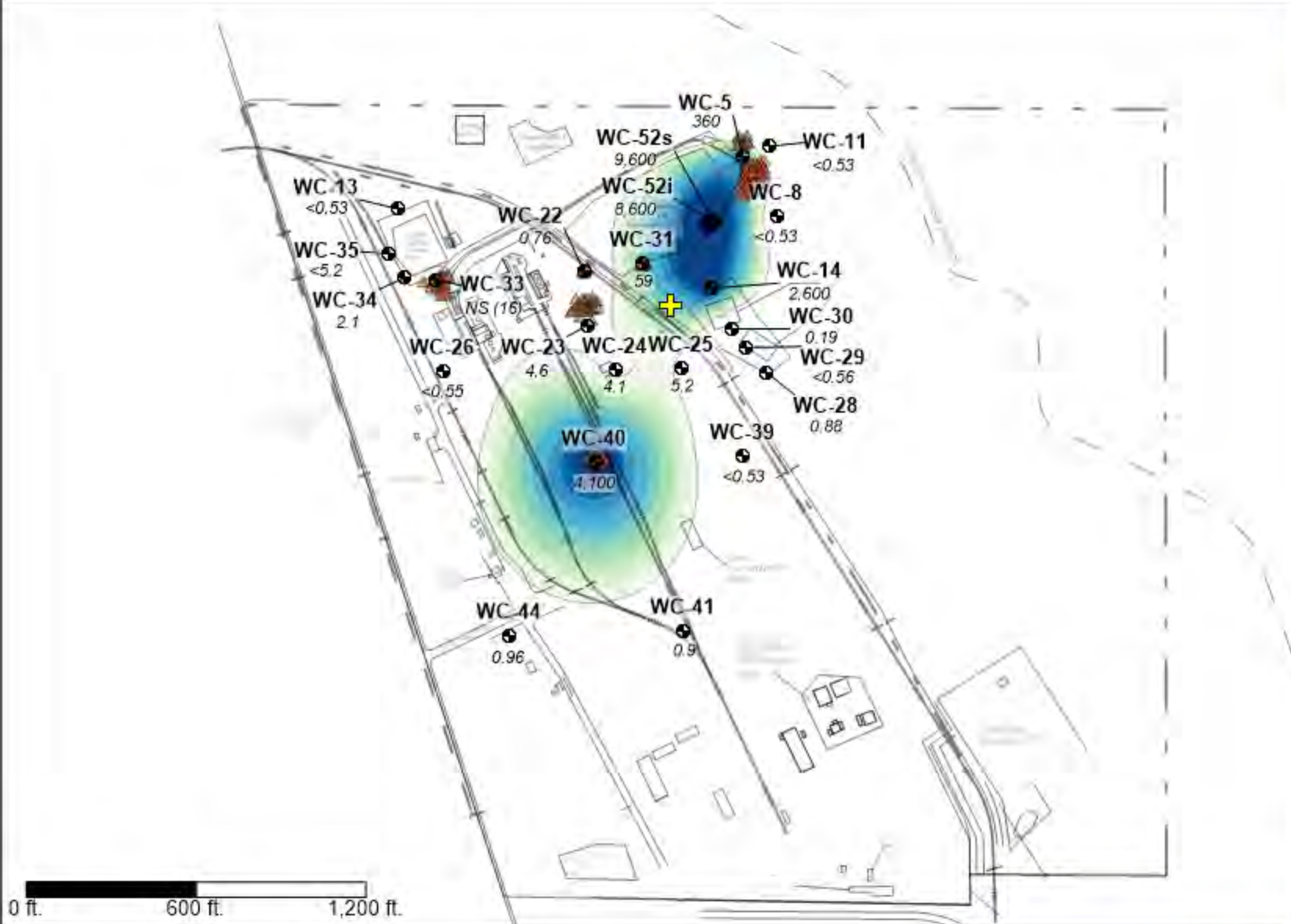
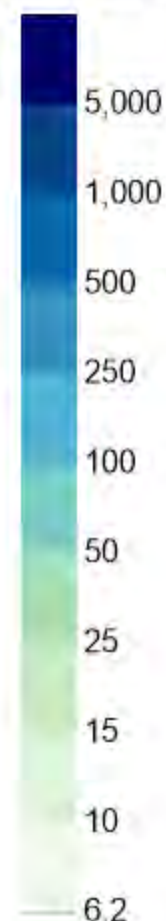
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene 2012

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (146) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 21.0 acres
Plume Average Concentration: 290 µg/L
Plume Mass Indicator: 99.3 lbs

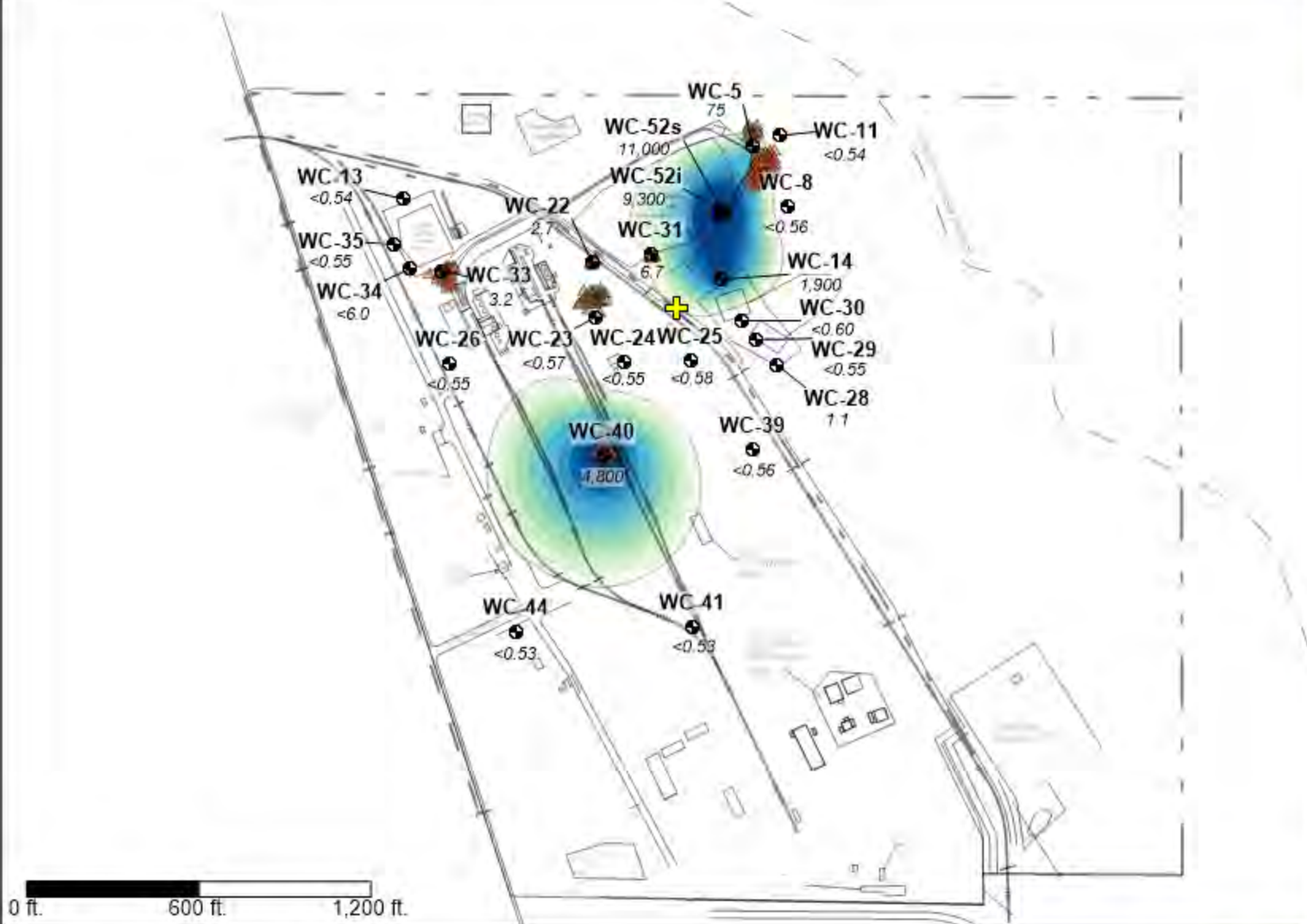
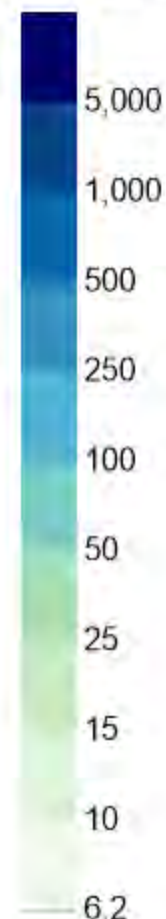
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges
BUSINESS SOLUTIONS

Naphthalene 2013

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **15.9 acres**
 Plume Average Concentration: **293 µg/L**
 Plume Mass Indicator: **76.3 lbs**

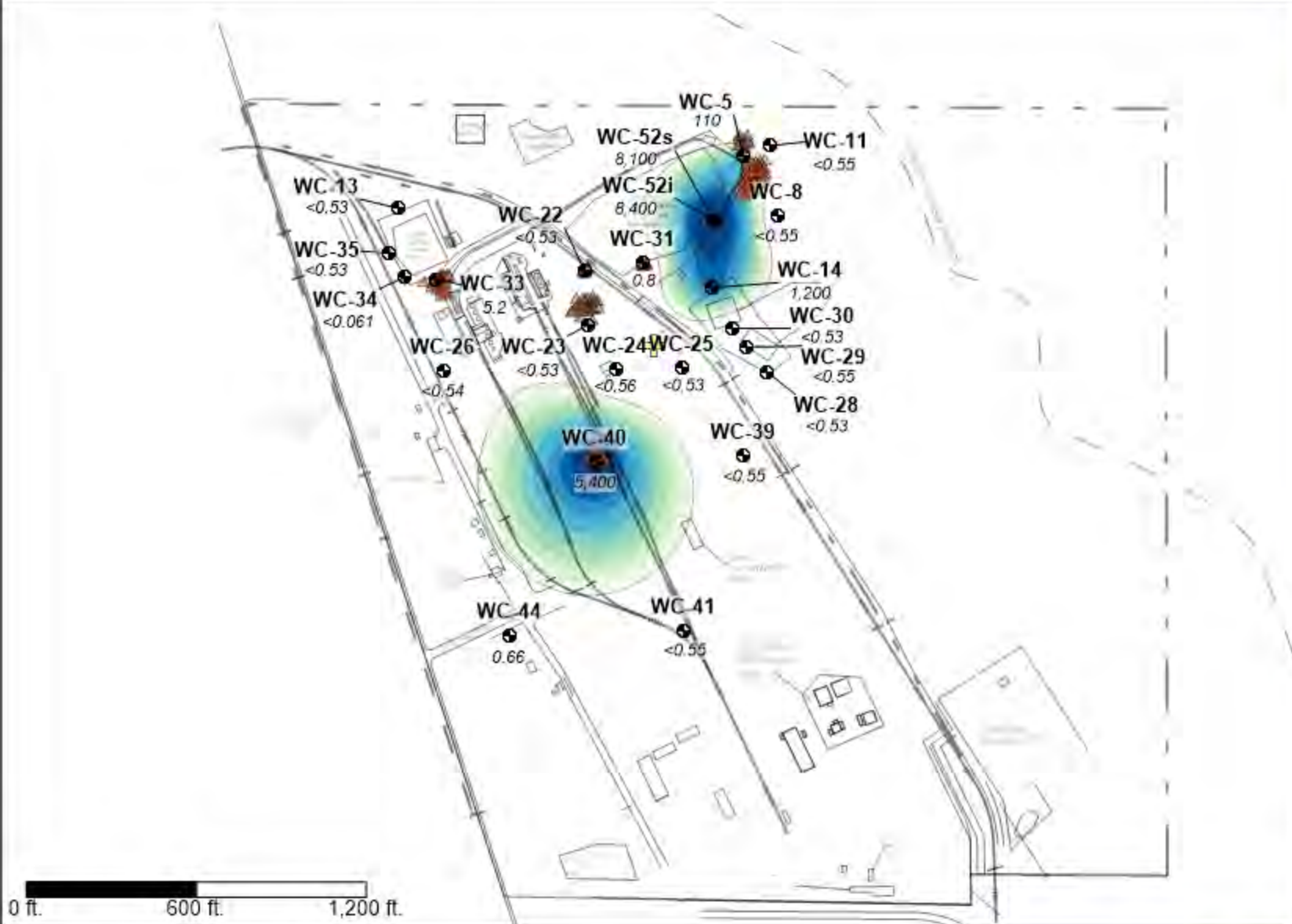
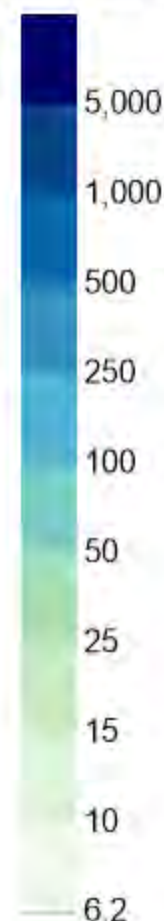
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene 2014

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 15.5 acres
Plume Average Concentration: 247 µg/L
Plume Mass Indicator: 62.6 lbs

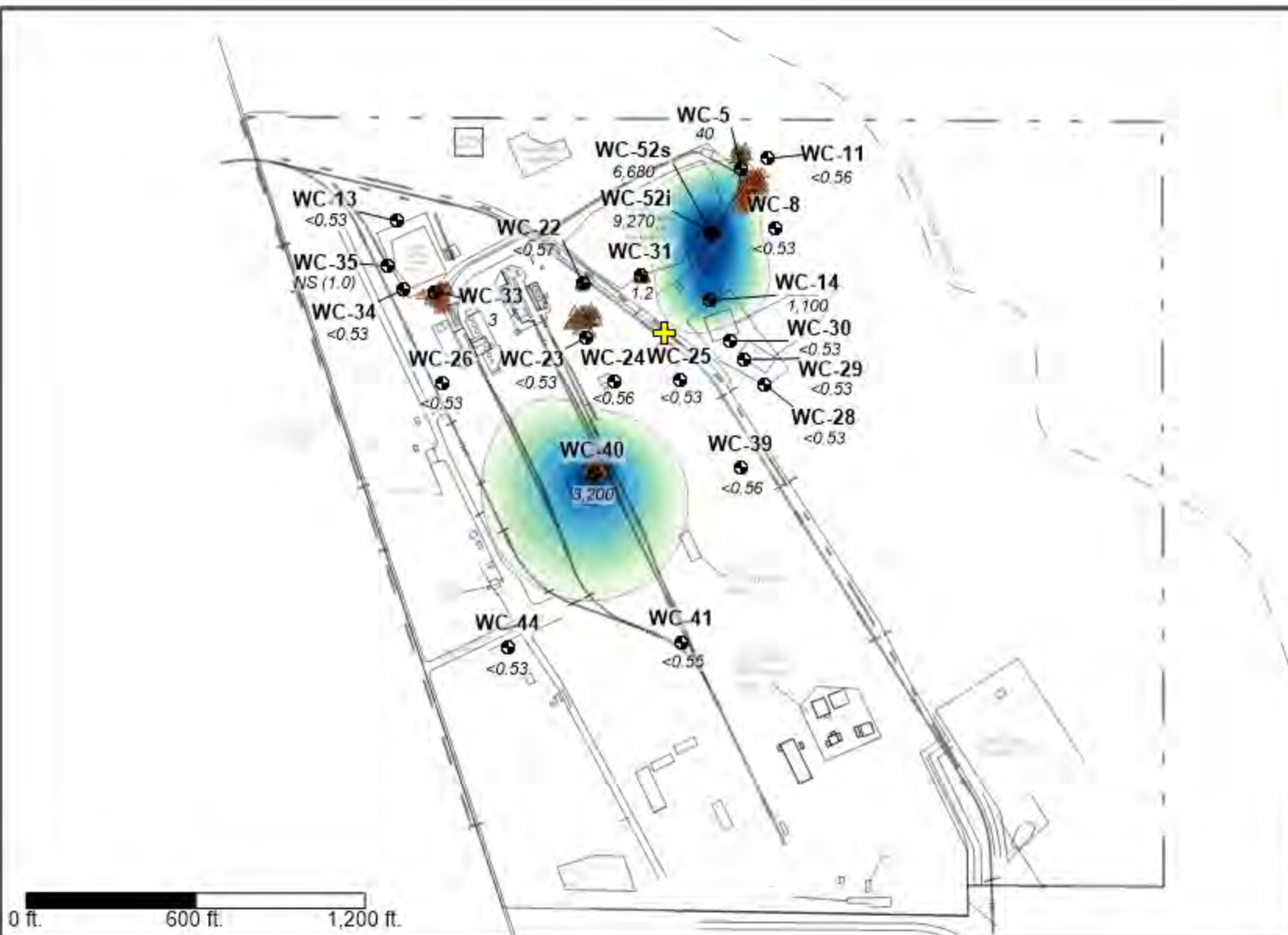
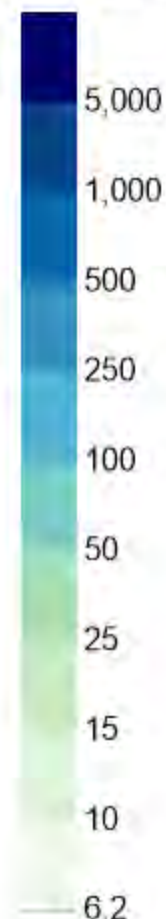
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Naphthalene 2015

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 40 Concentration (µg/L)
- NS (1.0) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **14.6 acres**
Plume Average Concentration: **221 µg/L**
Plume Mass Indicator: **52.8 lbs**

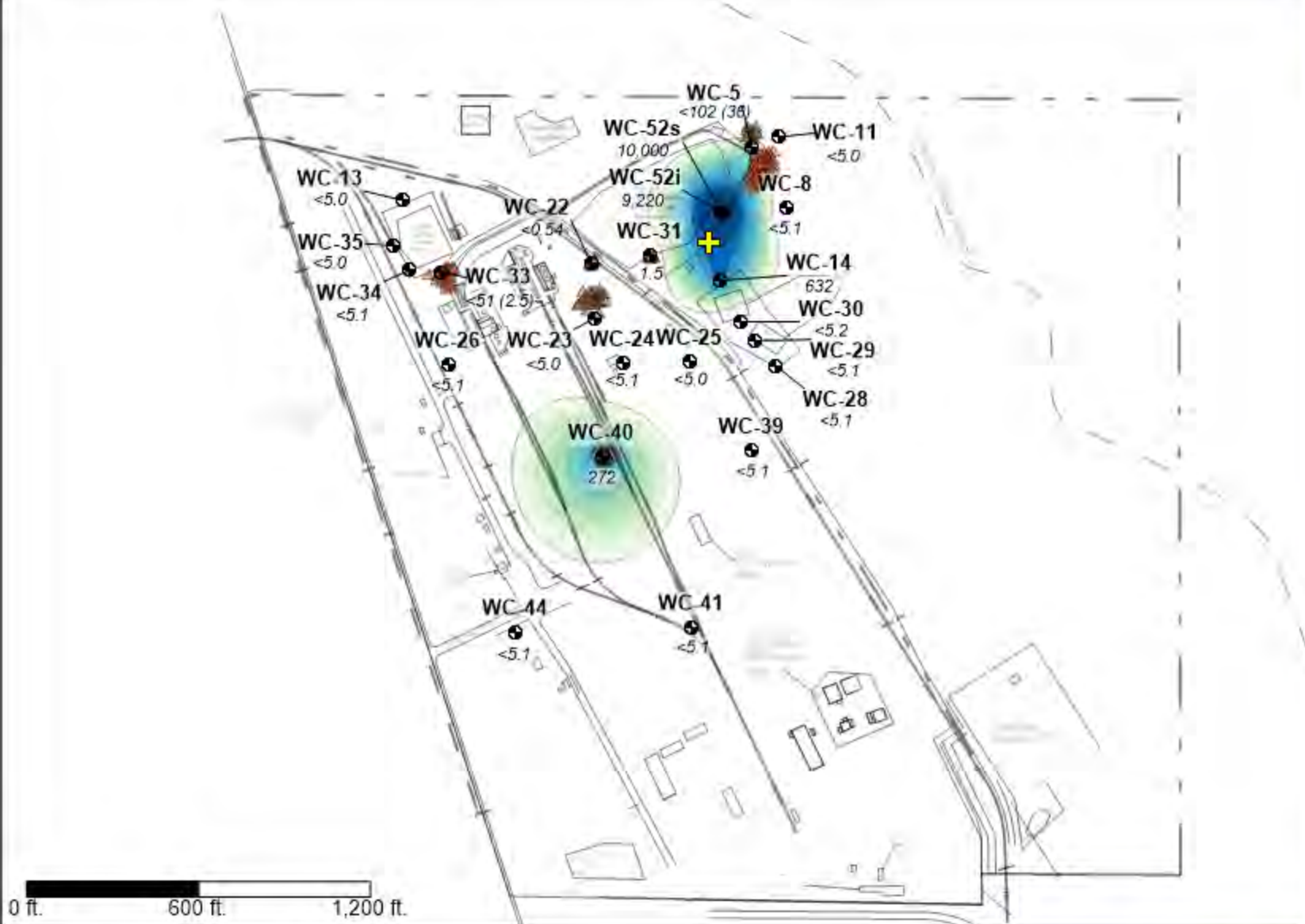
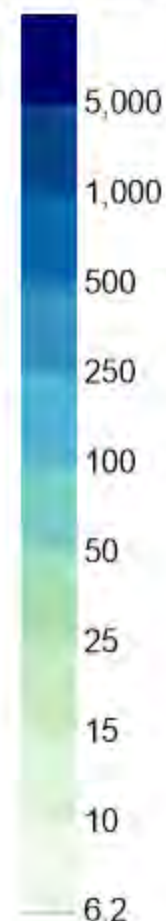
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges
BUSINESS SOLUTIONS**

Naphthalene 2016

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 49 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **11.3 acres**
Plume Average Concentration: **190 µg/L**
Plume Mass Indicator: **35.1 lbs**

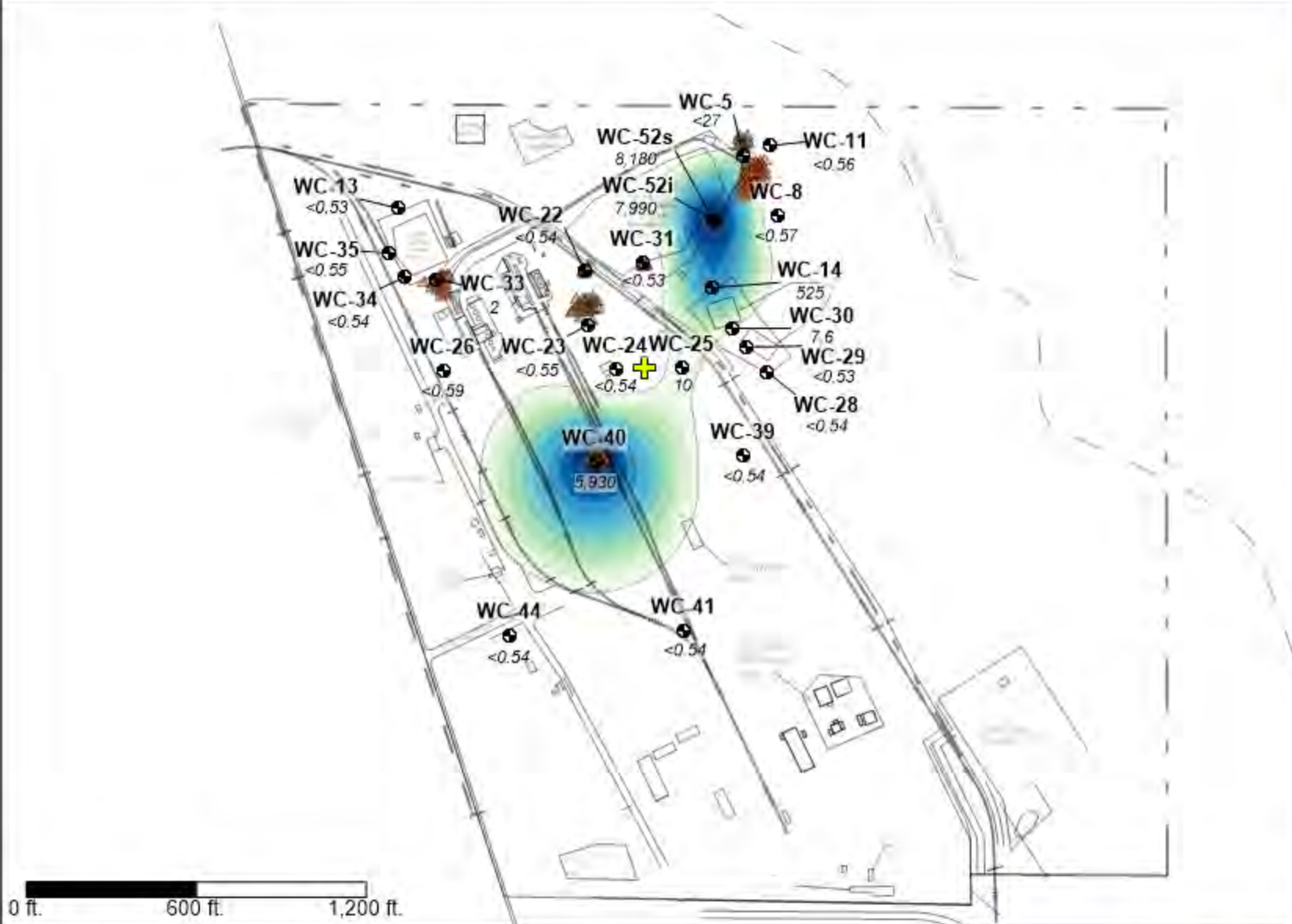
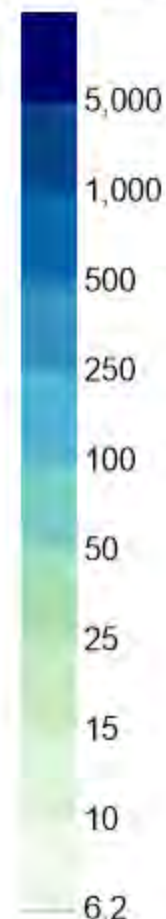
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges
BUSINESS SOLUTIONS

Naphthalene 2017

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 40 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **16.8 acres**
 Plume Average Concentration: **209 µg/L**
 Plume Mass Indicator: **57.4 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

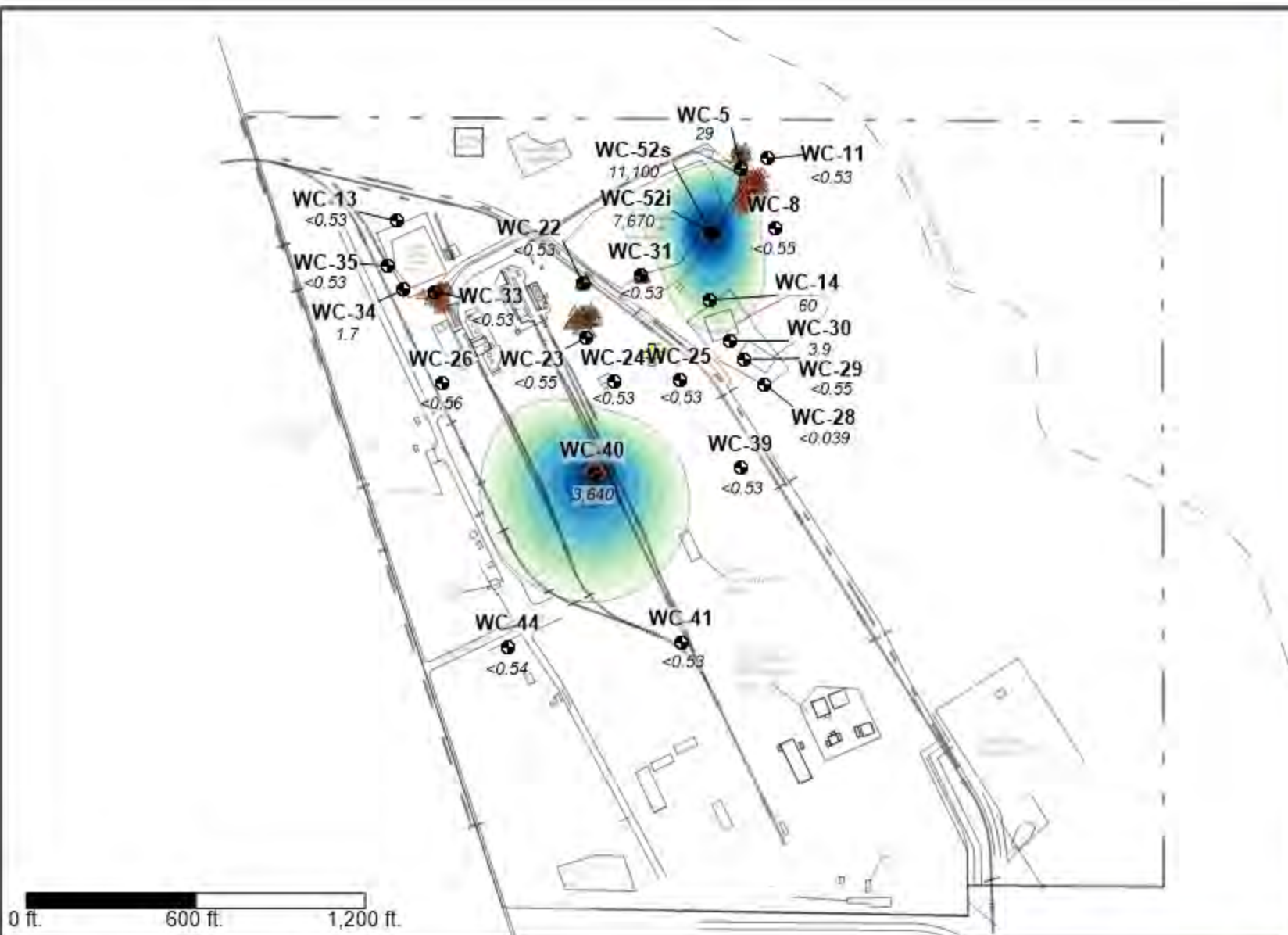
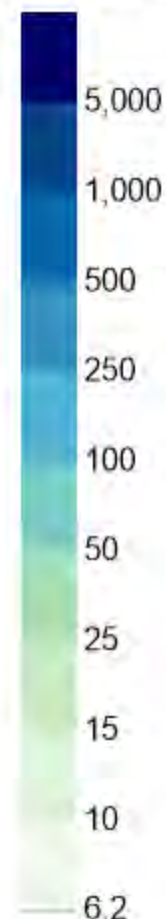


© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS®

Naphthalene

2018

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **14.3 acres**
 Plume Average Concentration: **192 µg/L**
 Plume Mass Indicator: **44.9 lbs**

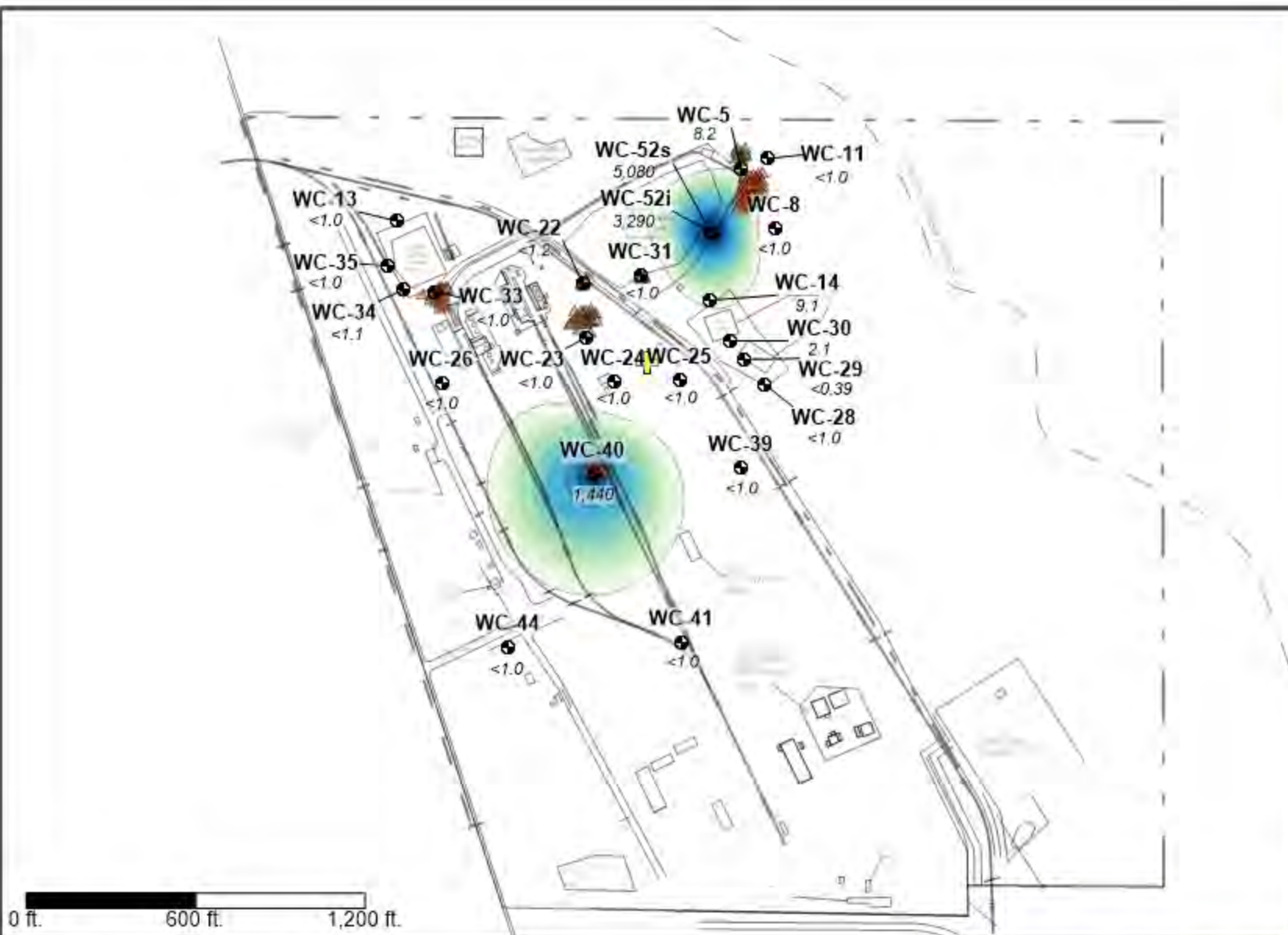
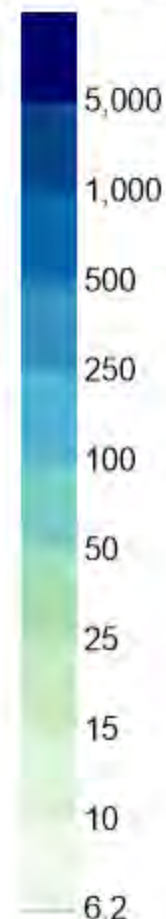
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Naphthalene 2019

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

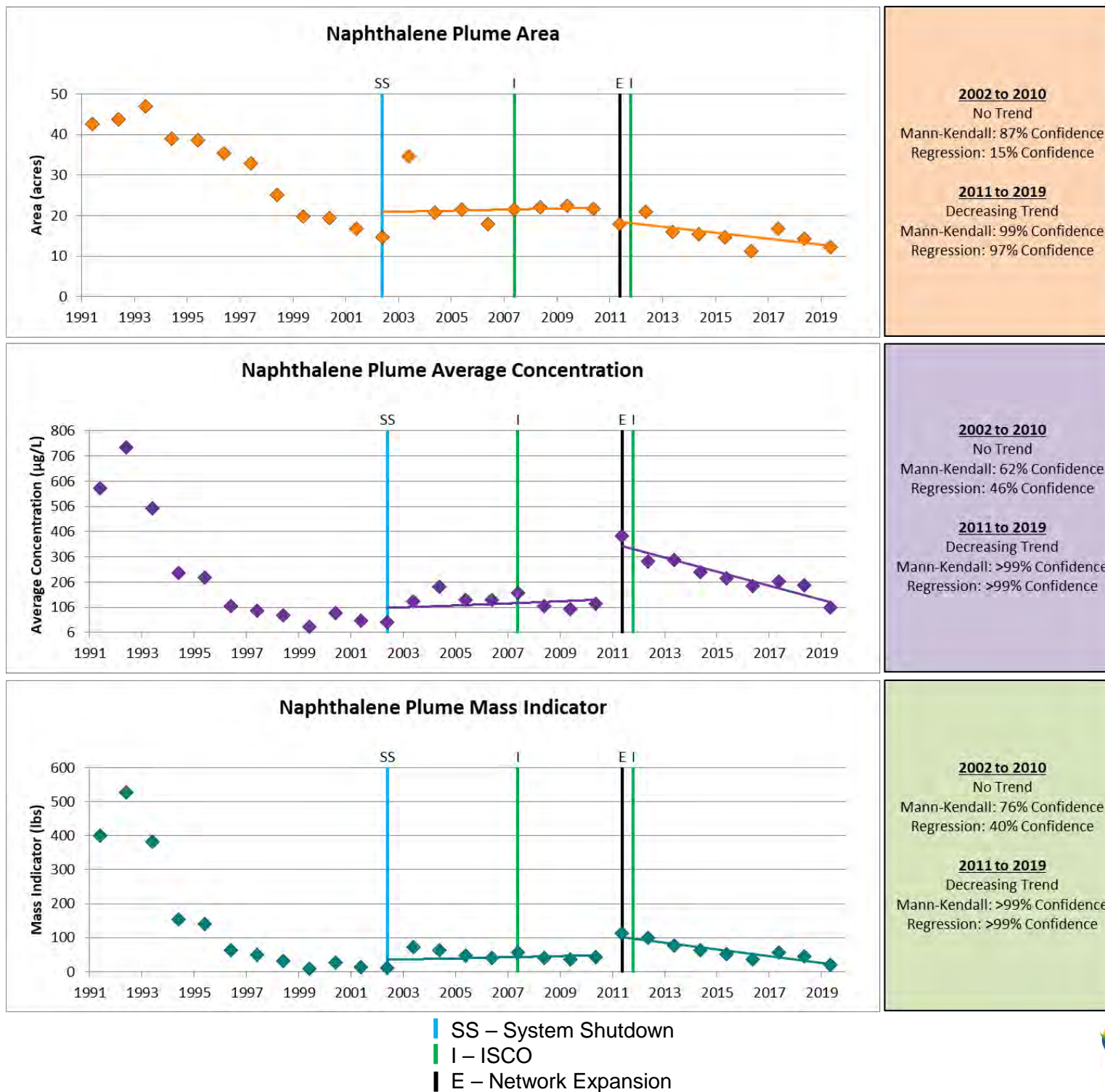
Plume Characteristics

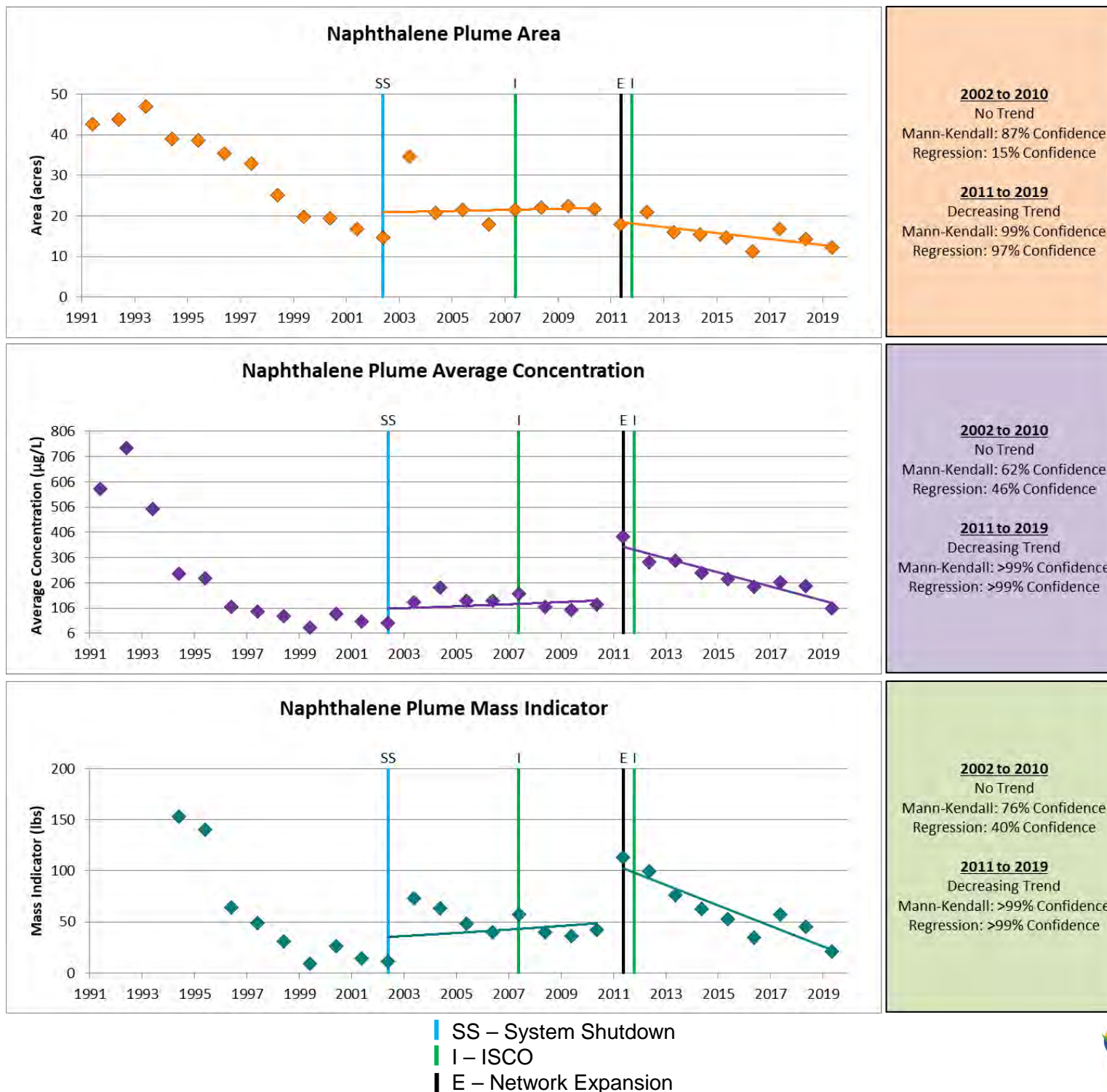
Plume Area: **12.2 acres**
 Plume Average Concentration: **105 µg/L**
 Plume Mass Indicator: **21.0 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

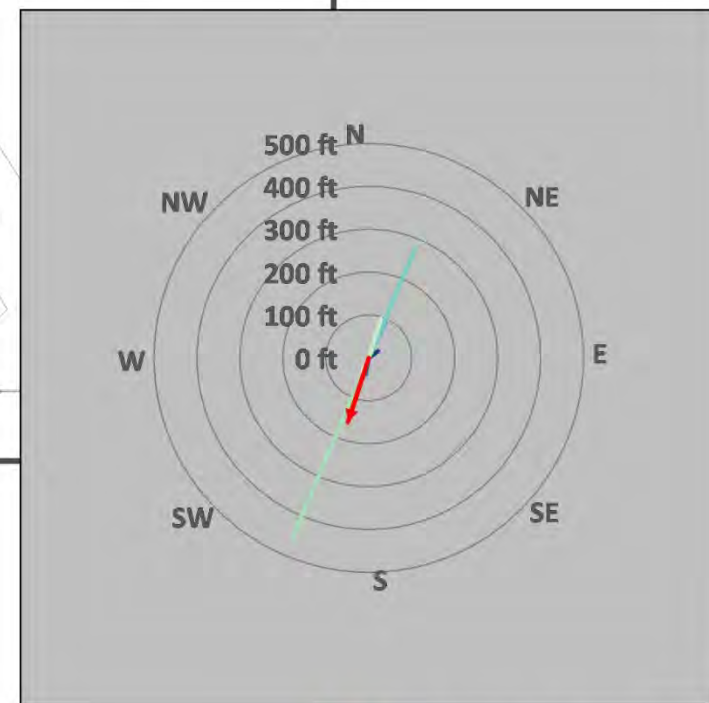
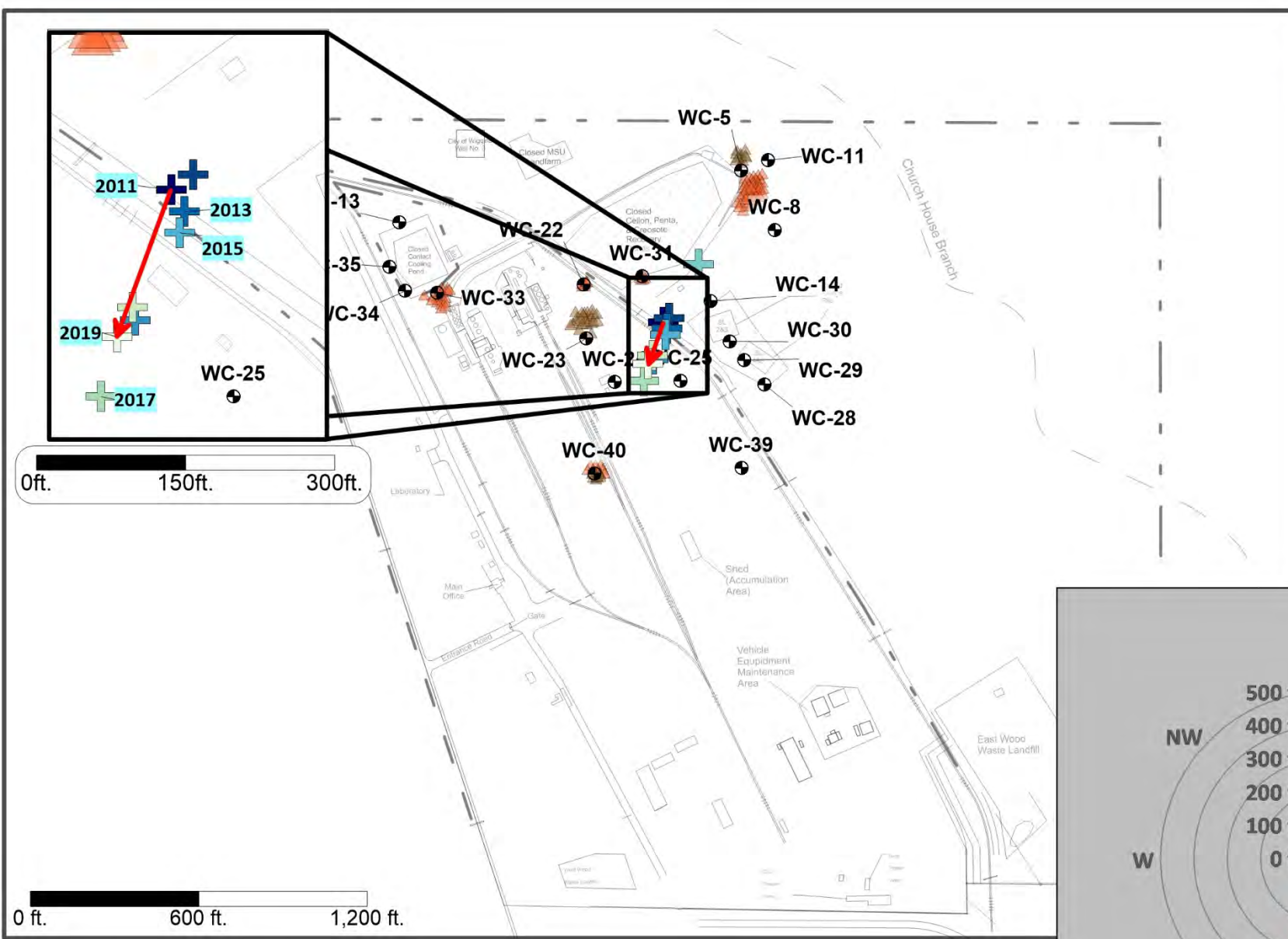


© EarthCon 2020 **Environmental Challenges
BUSINESS SOLUTIONS**



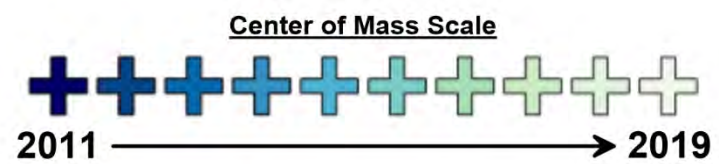


**Naphthalene
Center of Mass**

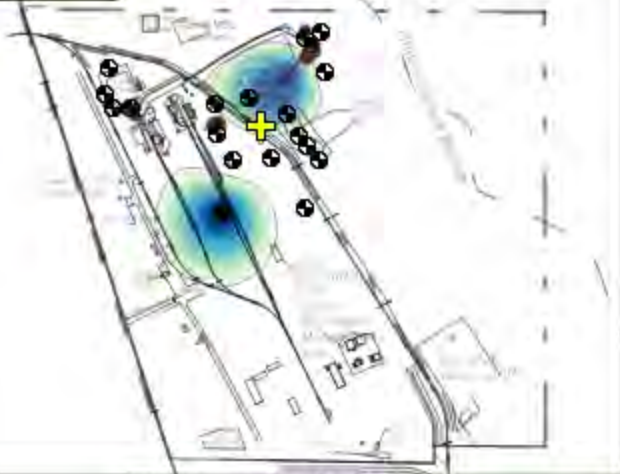


LEGEND

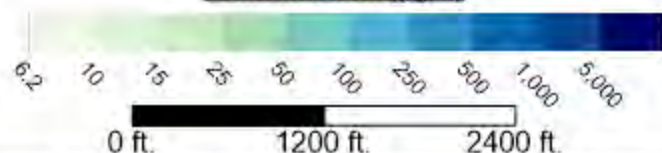
- Monitoring Well
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- Center of Mass Movement
- Net Movement



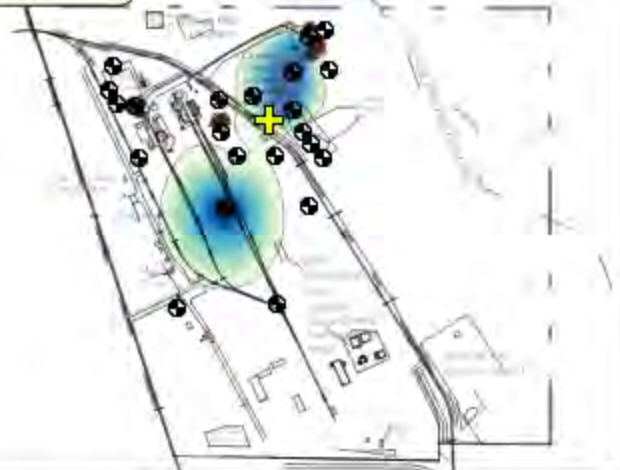
2011



Concentration ($\mu\text{g/L}$)



2012



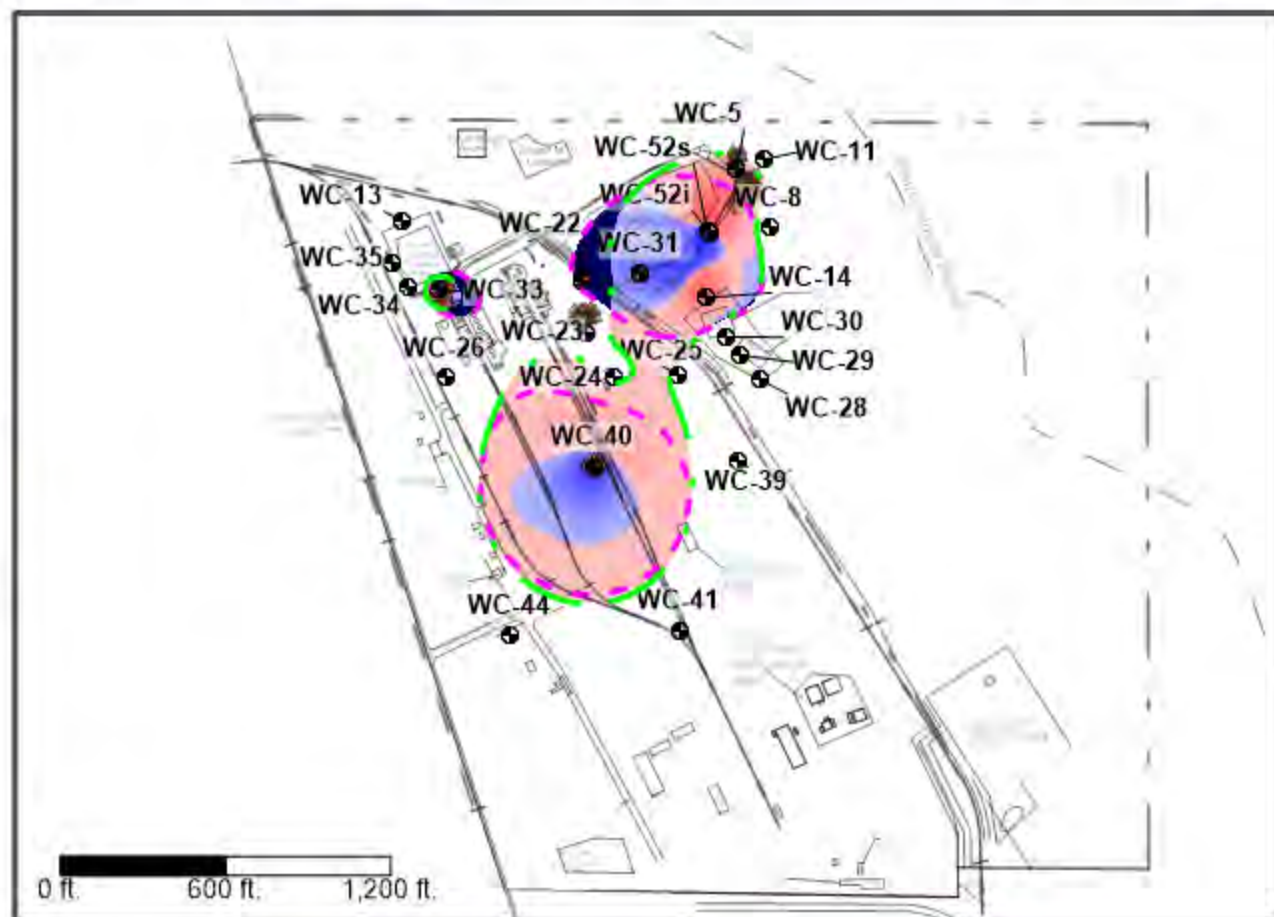
- LEGEND**
- WC-8 Monitoring Well
 - Plume Center of Mass
 - 2007 ISCO Injection Point
 - 2011 ISCO Injection Point
 - 2011 Plume Boundary
 - 2012 Plume Boundary

Plume Characteristics

Area: **18% Increase**
 Average Concentration: **26% Decrease**
 Mass Indicator: **13% Decrease**
 Mass Increase: **15.0 lbs Increase**
 Mass Decrease: **29.1 lbs Decrease**

Naphthalene

Plume Differences 2011 vs 2012



Spatial Change Indicator™



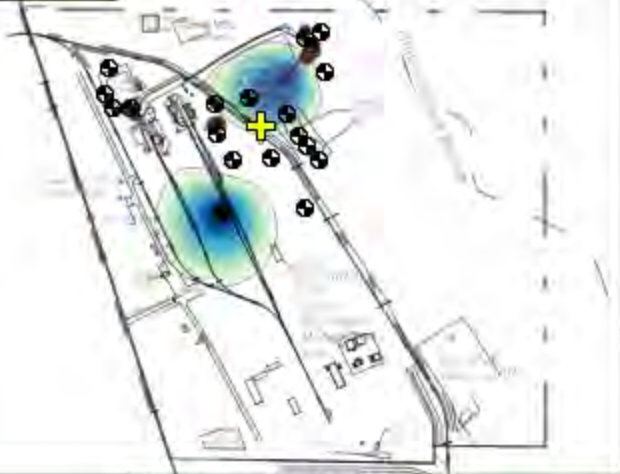
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

EARTHCON

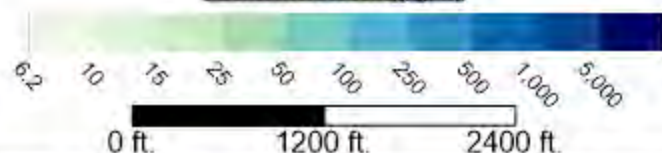
Environmental Challenges
 BUSINESS SOLUTIONS

© EarthCon 2020

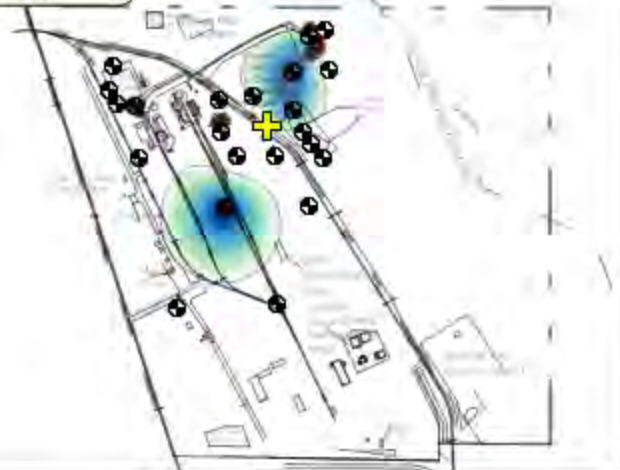
2011



Concentration ($\mu\text{g/L}$)

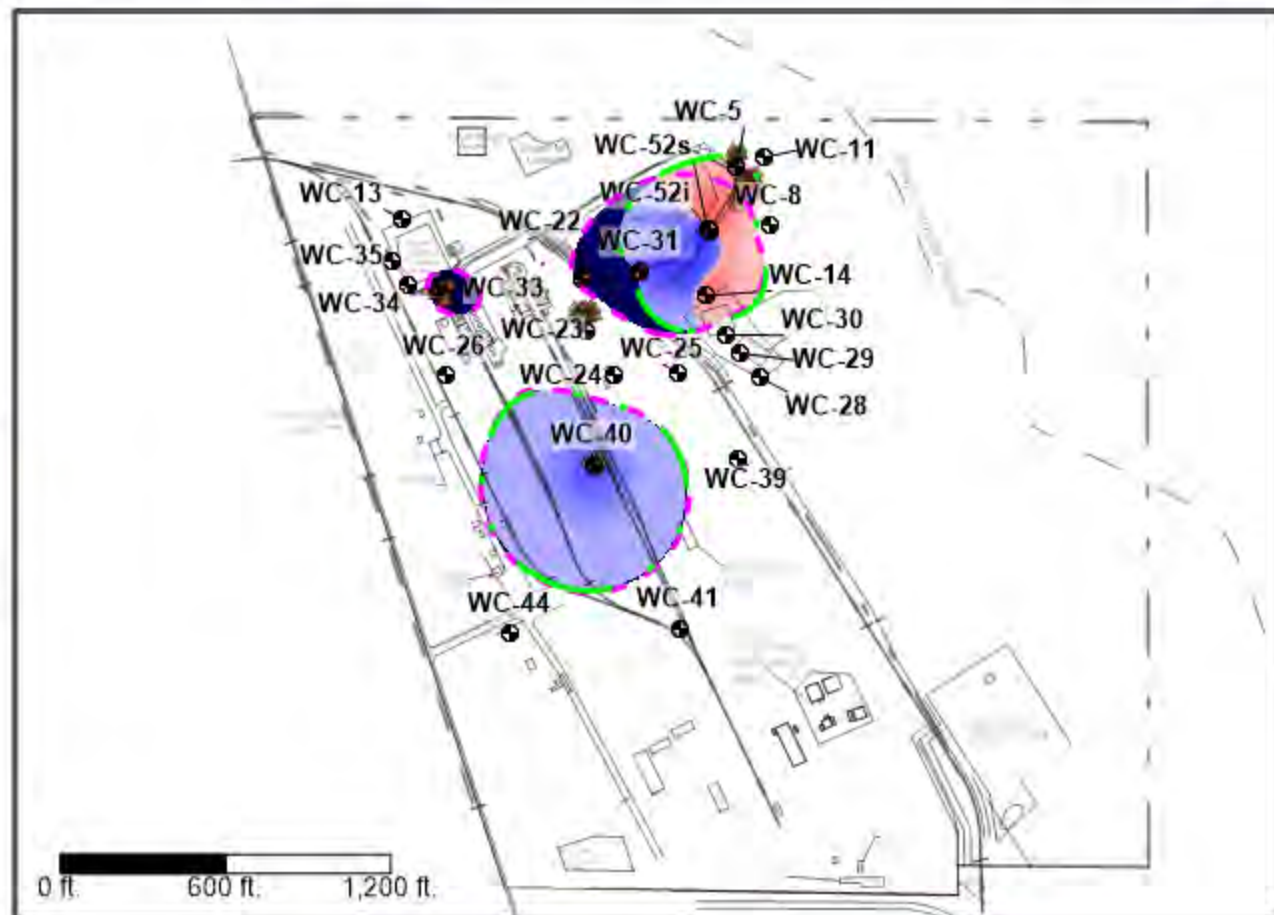


2013



Naphthalene

Plume Differences 2011 vs 2013



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2013 Plume Boundary

Plume Characteristics

Area: 11% Decrease
 Average Concentration: 25% Decrease
 Mass Indicator: 33% Decrease
 Mass Increase: 6.07 lbs Increase
 Mass Decrease: 43.3 lbs Decrease

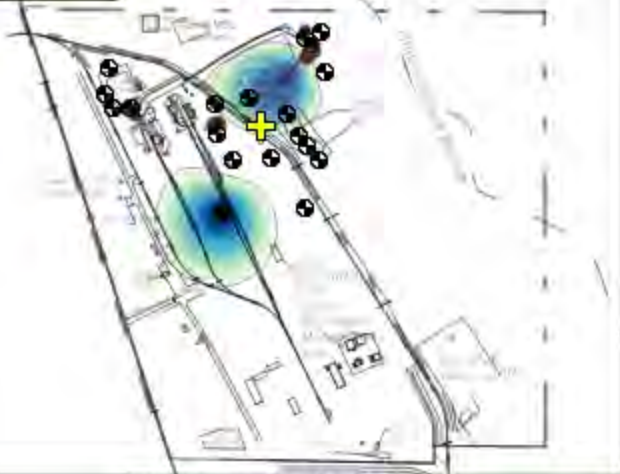
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



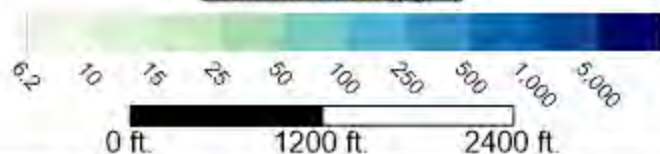
Environmental Challenges
 BUSINESS SOLUTIONS®

© EarthCon 2020

2011



Concentration ($\mu\text{g/L}$)

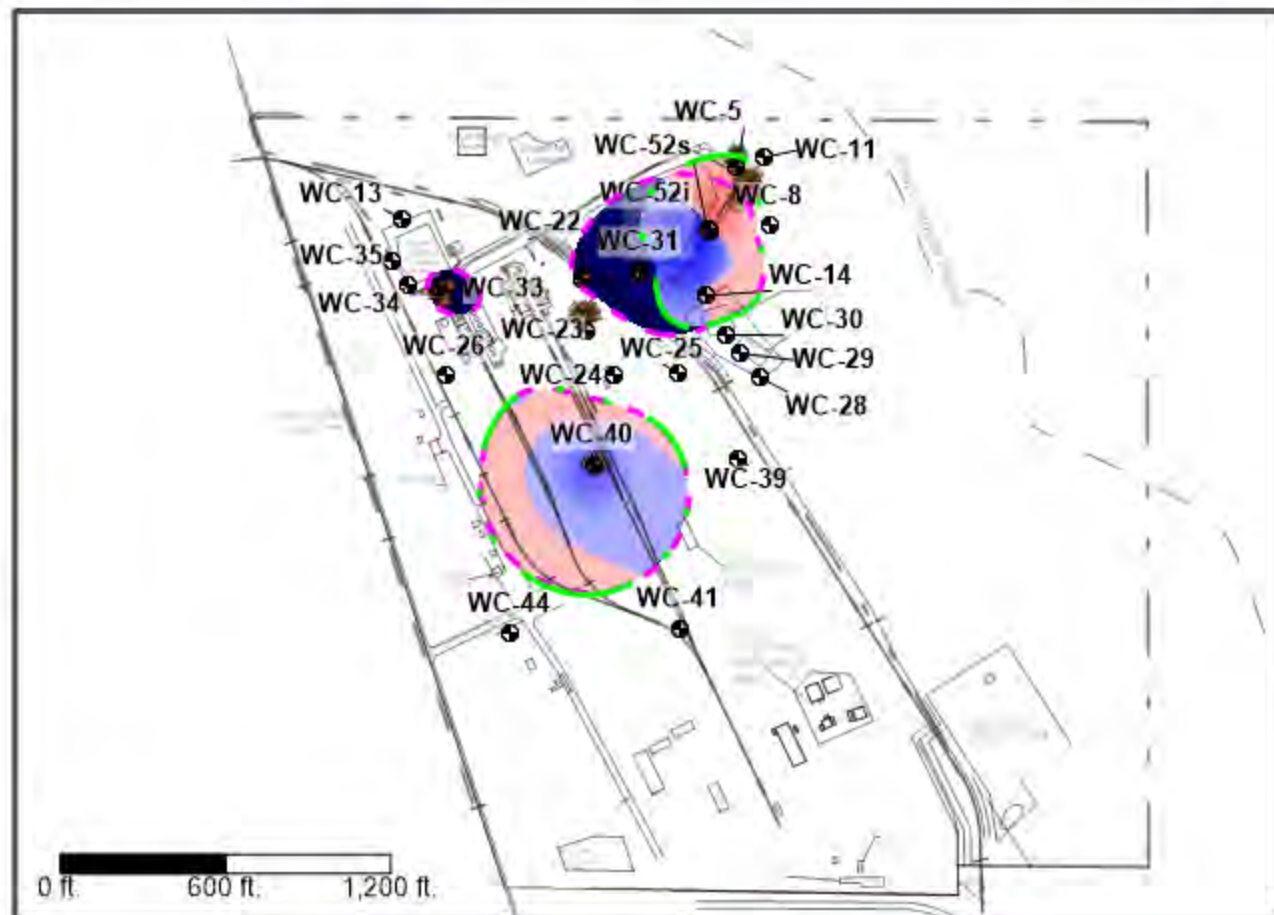


2014



Naphthalene

Plume Differences 2011 vs 2014



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2014 Plume Boundary

Plume Characteristics

Area: 13% Decrease
 Average Concentration: 37% Decrease
 Mass Indicator: 45% Decrease
 Mass Increase: 3.69 lbs Increase
 Mass Decrease: 54.6 lbs Decrease

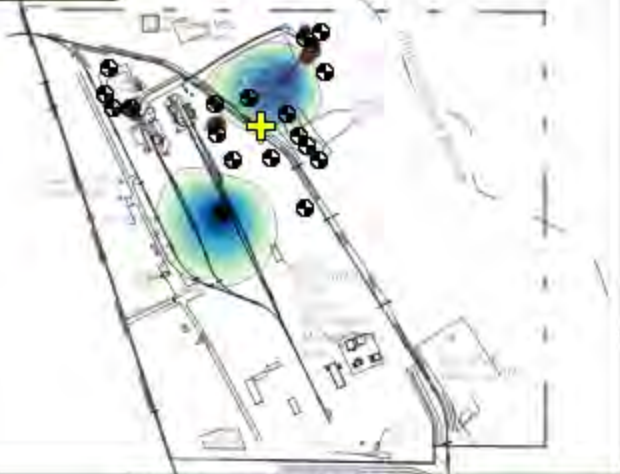
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

EARTHCON

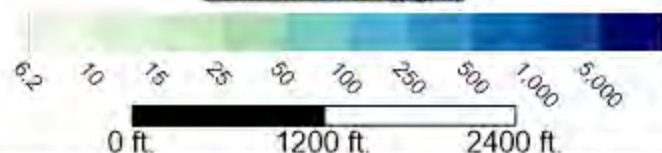
Environmental Challenges
 BUSINESS SOLUTIONS

© EarthCon 2020

2011



Concentration ($\mu\text{g/L}$)



2015



WC-8

Monitoring Well



Plume Center of Mass



2007 ISCO Injection Point



2011 ISCO Injection Point



2011 Plume Boundary



2015 Plume Boundary

LEGEND

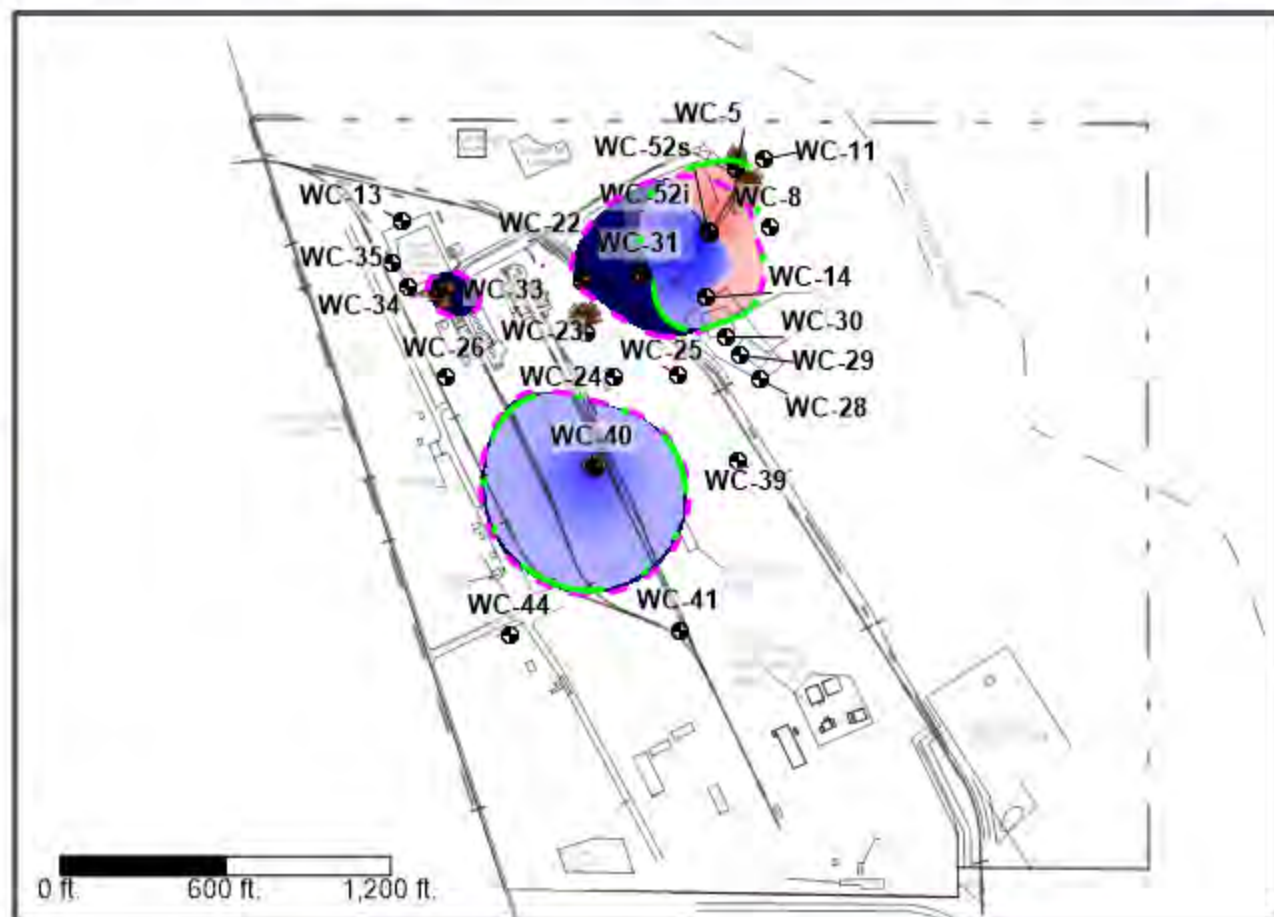


Plume Characteristics

Area: 18% Decrease
 Average Concentration: 43% Decrease
 Mass Indicator: 54% Decrease
 Mass Increase: 2.48 lbs Increase
 Mass Decrease: 63.2 lbs Decrease

Naphthalene

Plume Differences 2011 vs 2015



Spatial Change Indicator™



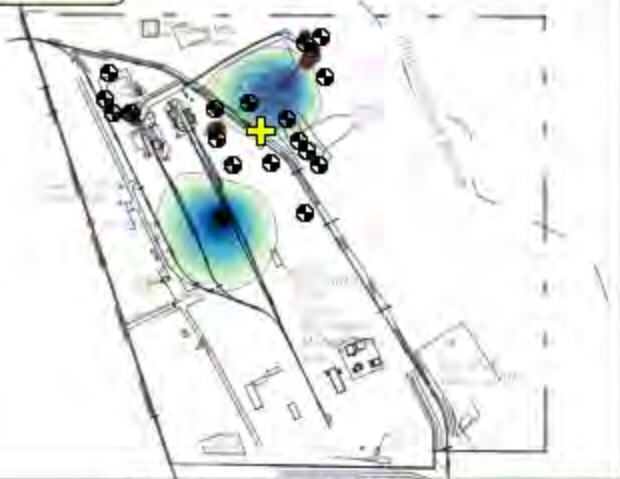
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



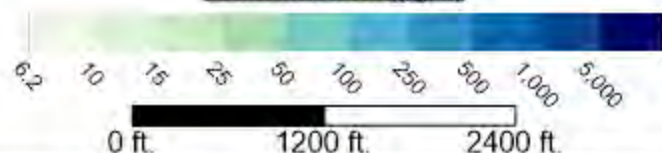
© EarthCon 2020

Environmental Challenges
 BUSINESS SOLUTIONS®

2011



Concentration ($\mu\text{g/L}$)

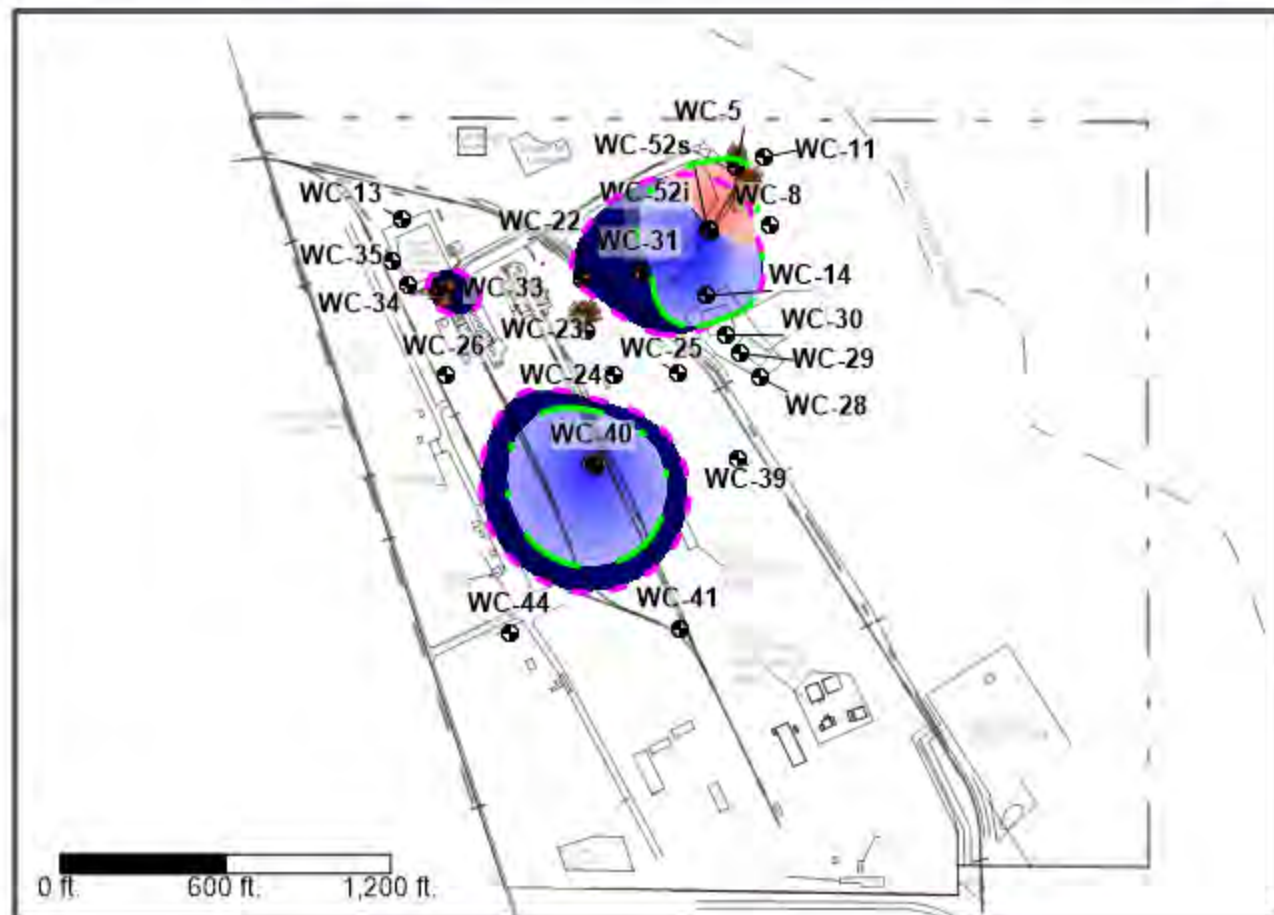


2016



Naphthalene

Plume Differences 2011 vs 2016



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2016 Plume Boundary

Plume Characteristics

Area: 37% Decrease
 Average Concentration: 51% Decrease
 Mass Indicator: 69% Decrease
 Mass Increase: 2.34 lbs Increase
 Mass Decrease: 80.8 lbs Decrease

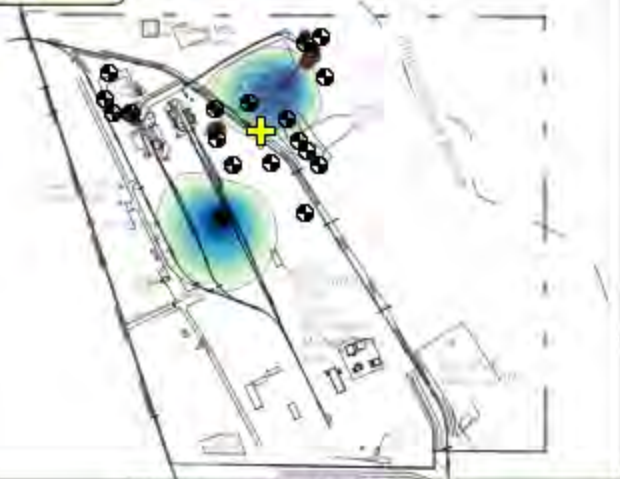
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



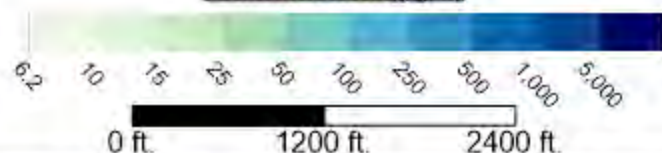
Environmental Challenges
 BUSINESS SOLUTIONS®

© EarthCon 2020

2011



Concentration ($\mu\text{g/L}$)

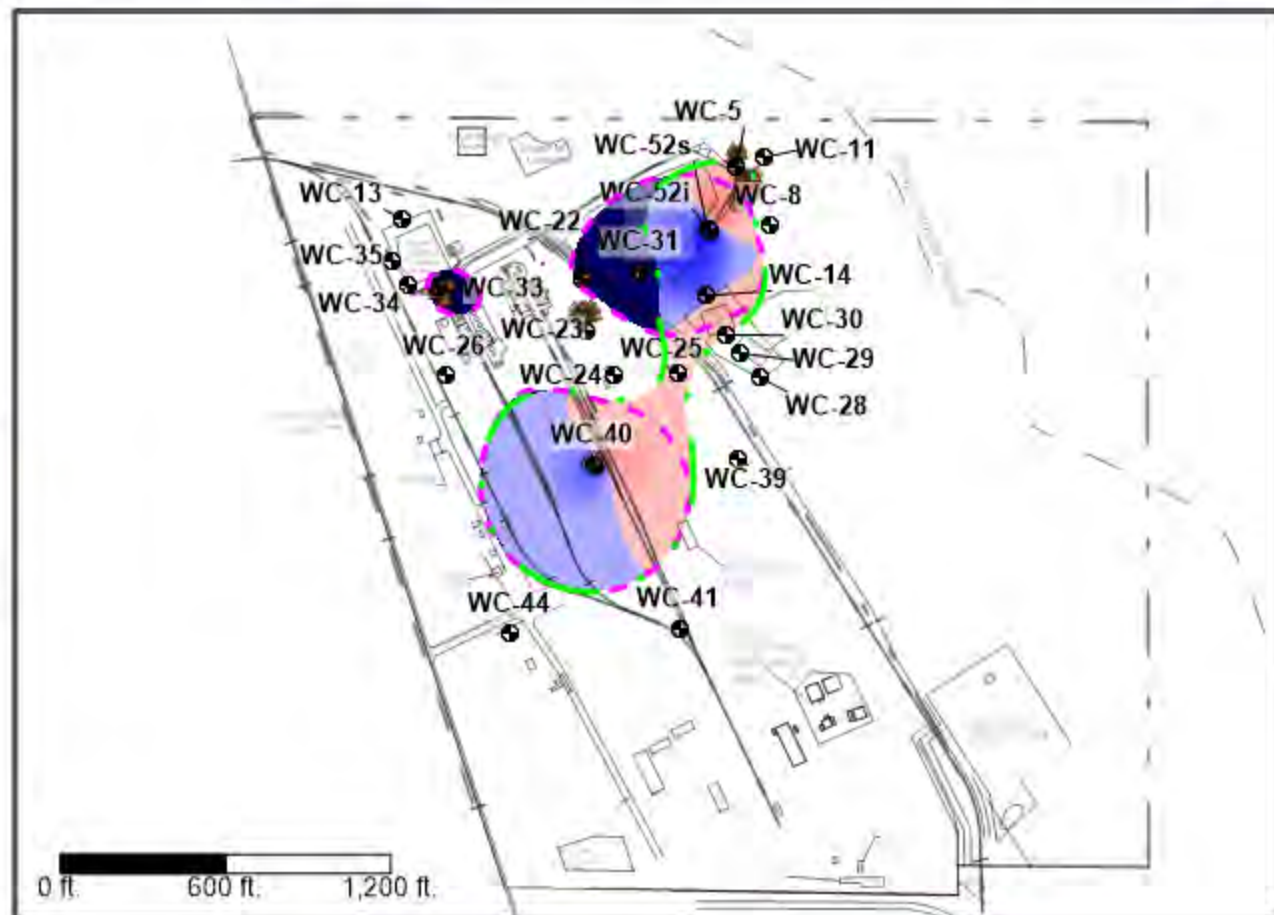


2017



Naphthalene

Plume Differences 2011 vs 2017



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2017 Plume Boundary

Plume Characteristics

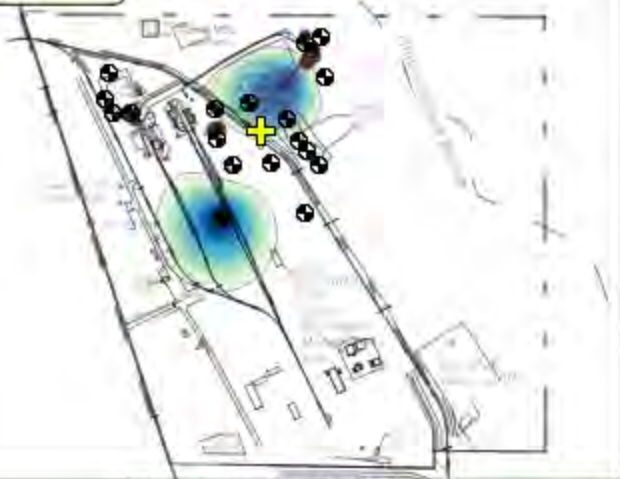
Area: 6% Decrease
 Average Concentration: 46% Decrease
 Mass Indicator: 49% Decrease
 Mass Increase: 2.81 lbs Increase
 Mass Decrease: 58.9 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

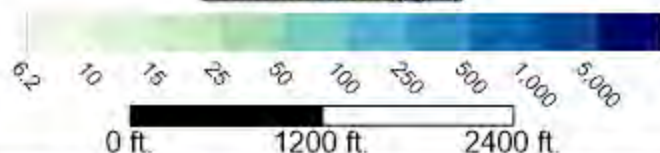
EARTHCON
 Environmental Challenges
 BUSINESS SOLUTIONS

© EarthCon 2020

2011



Concentration ($\mu\text{g/L}$)

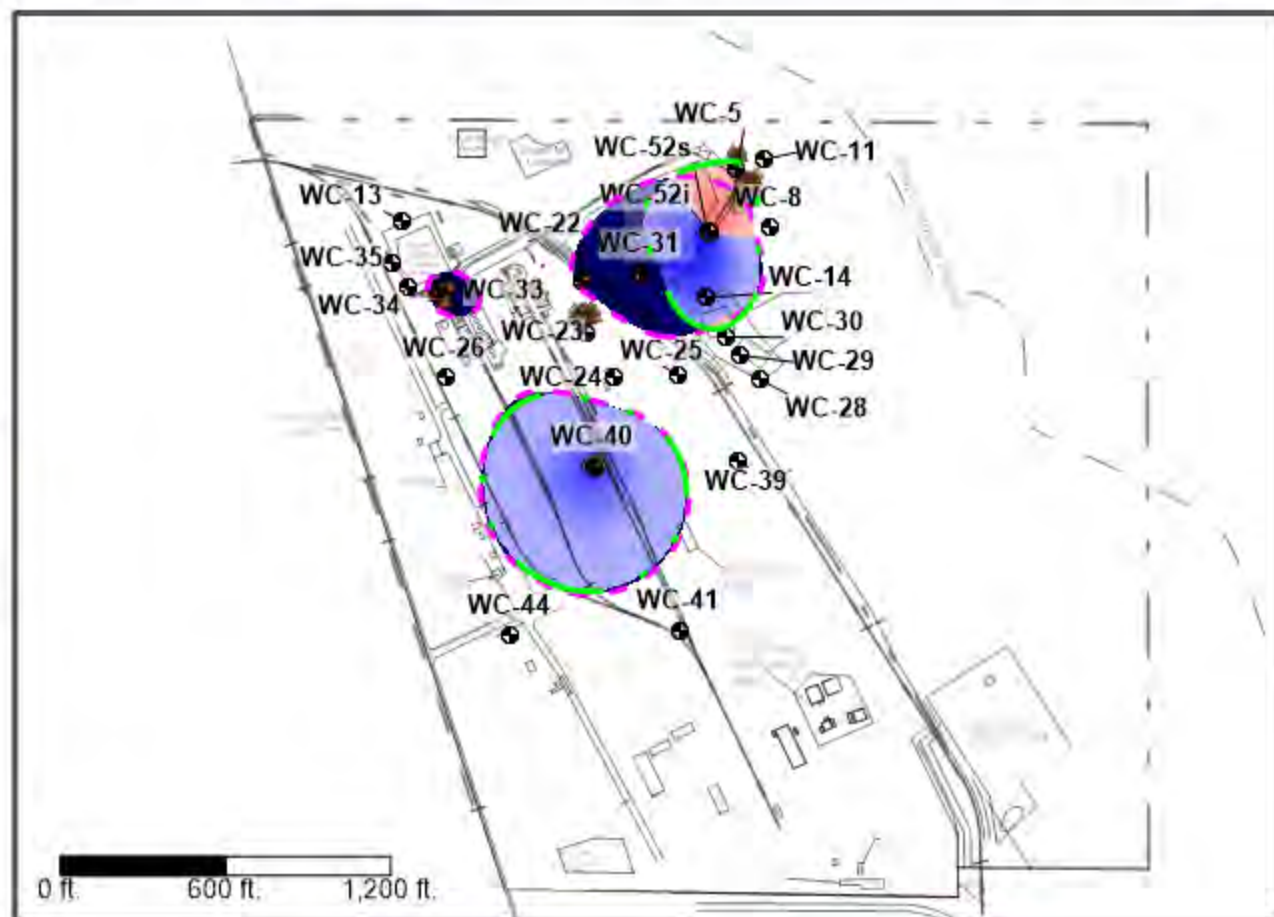


2018



Naphthalene

Plume Differences 2011 vs 2018



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2018 Plume Boundary

Plume Characteristics

Area: 20% Decrease
 Average Concentration: 51% Decrease
 Mass Indicator: 60% Decrease
 Mass Increase: 2.32 lbs Increase
 Mass Decrease: 70.9 lbs Decrease

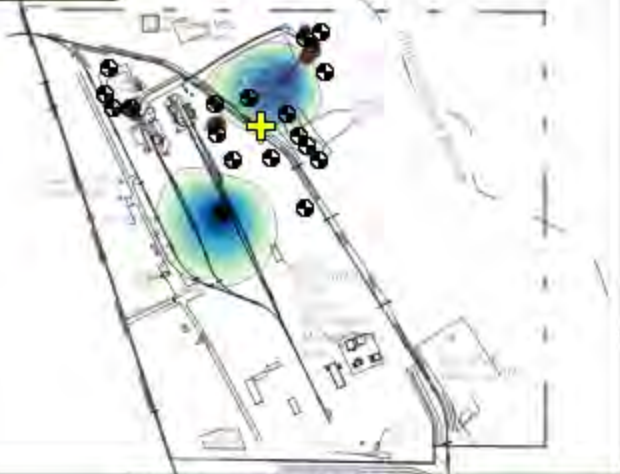
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



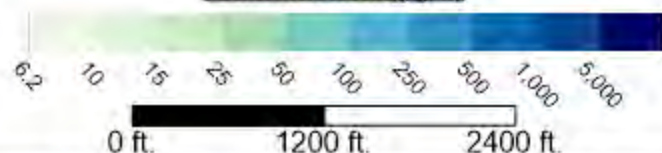
Environmental Challenges
 BUSINESS SOLUTIONS®

© EarthCon 2020

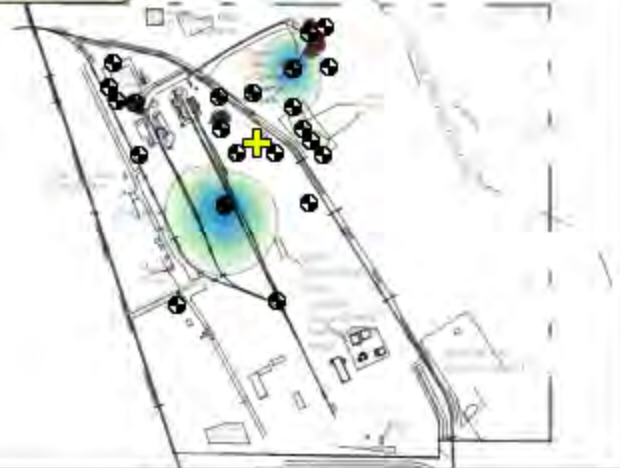
2011



Concentration ($\mu\text{g/L}$)

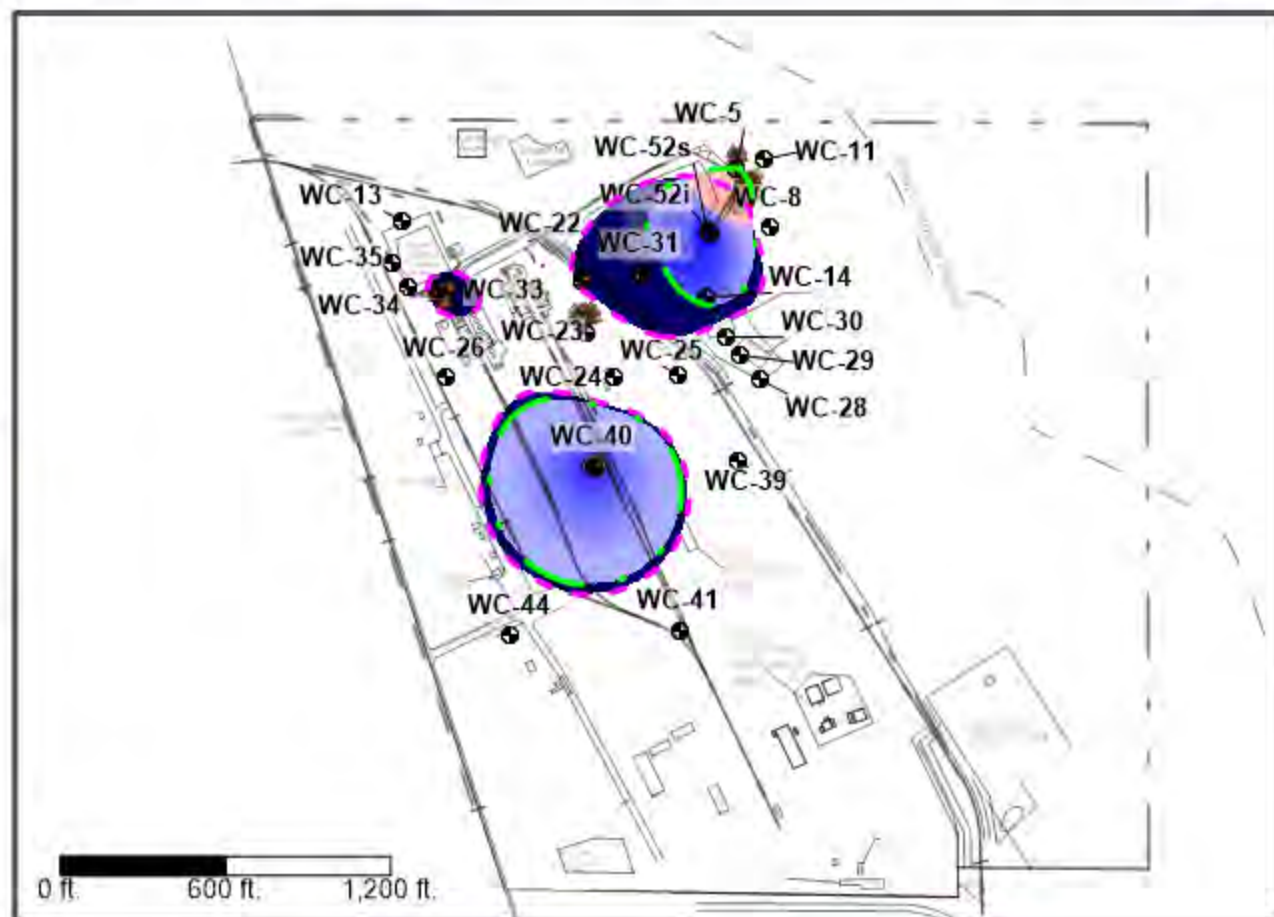


2019



Naphthalene

Plume Differences 2011 vs 2019



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2019 Plume Boundary

Plume Characteristics

Area: 32% Decrease
 Average Concentration: 73% Decrease
 Mass Indicator: 81% Decrease
 Mass Increase: 0.27 lbs Increase
 Mass Decrease: 92.7 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

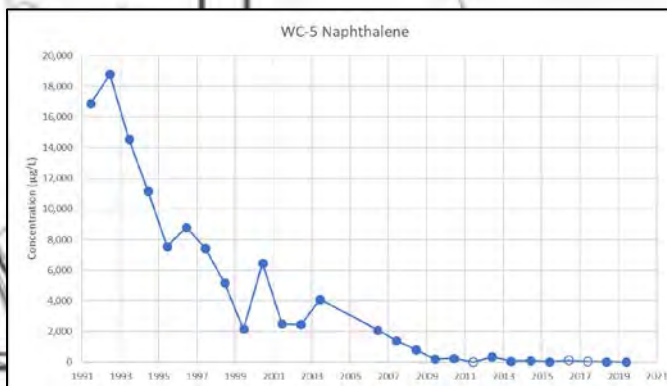
EARTHCON
 Environmental Challenges
 BUSINESS SOLUTIONS

© EarthCon 2020

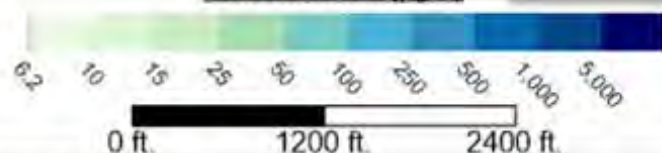
2011

Naphthalene

Plume Differences 2011 vs 2019



Concentration (µg/L)



2019

0 ft. 600 ft. 1,200 ft.

Spatial Change Indicator™



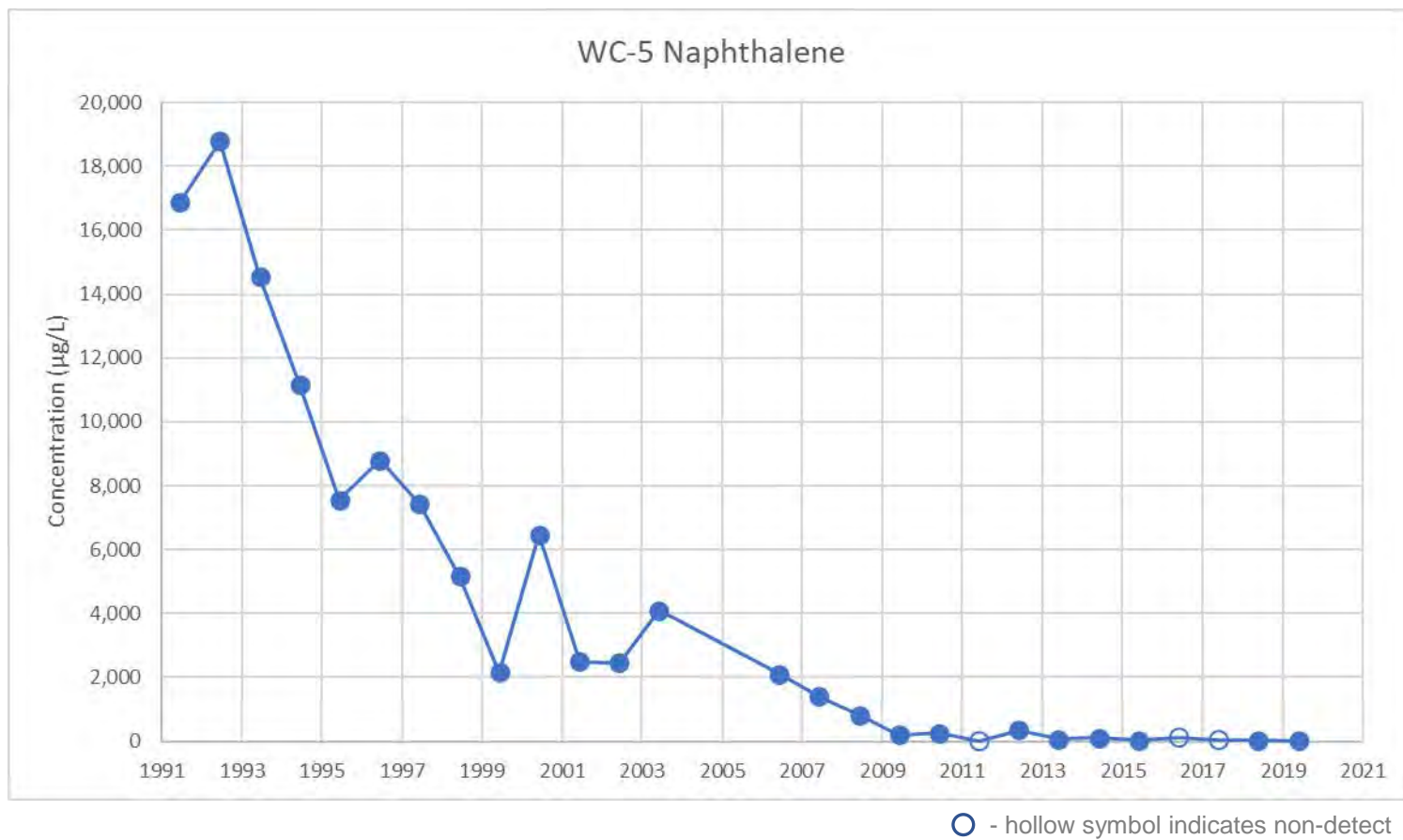
LEGEND

- WC-5 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2019 Plume Boundary

Plume Characteristics

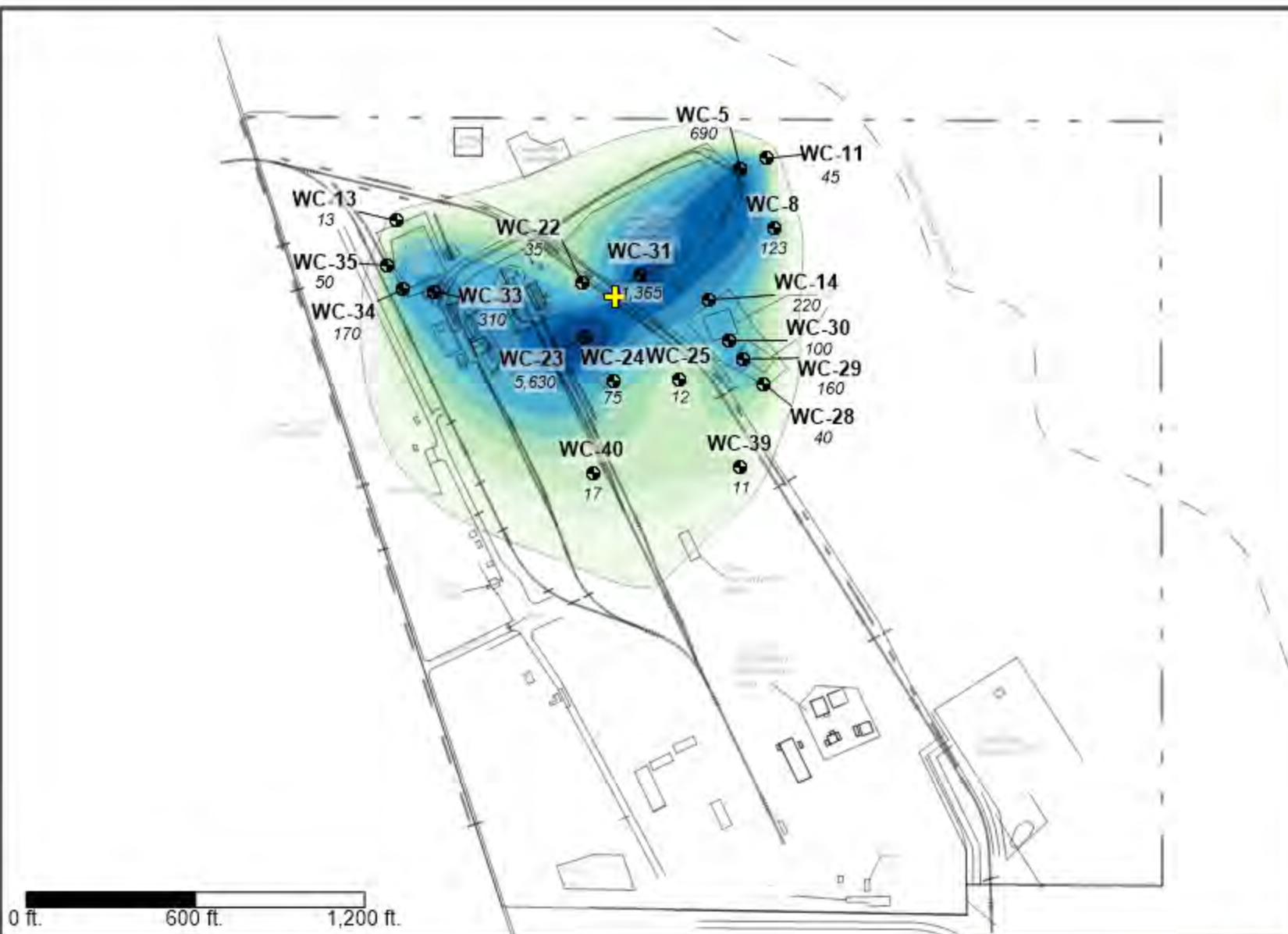
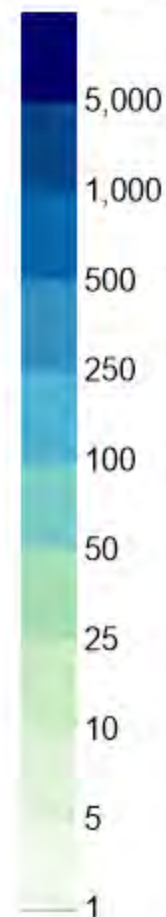
Area: 32% Decrease
 Average Concentration: 73% Decrease
 Mass Indicator: 81% Decrease
 Mass Increase: 0.27 lbs Increase
 Mass Decrease: 92.7 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Pentachlorophenol **1991**

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **45.5 acres**
 Plume Average Concentration: **157 µg/L**
 Plume Mass Indicator: **117 lbs**

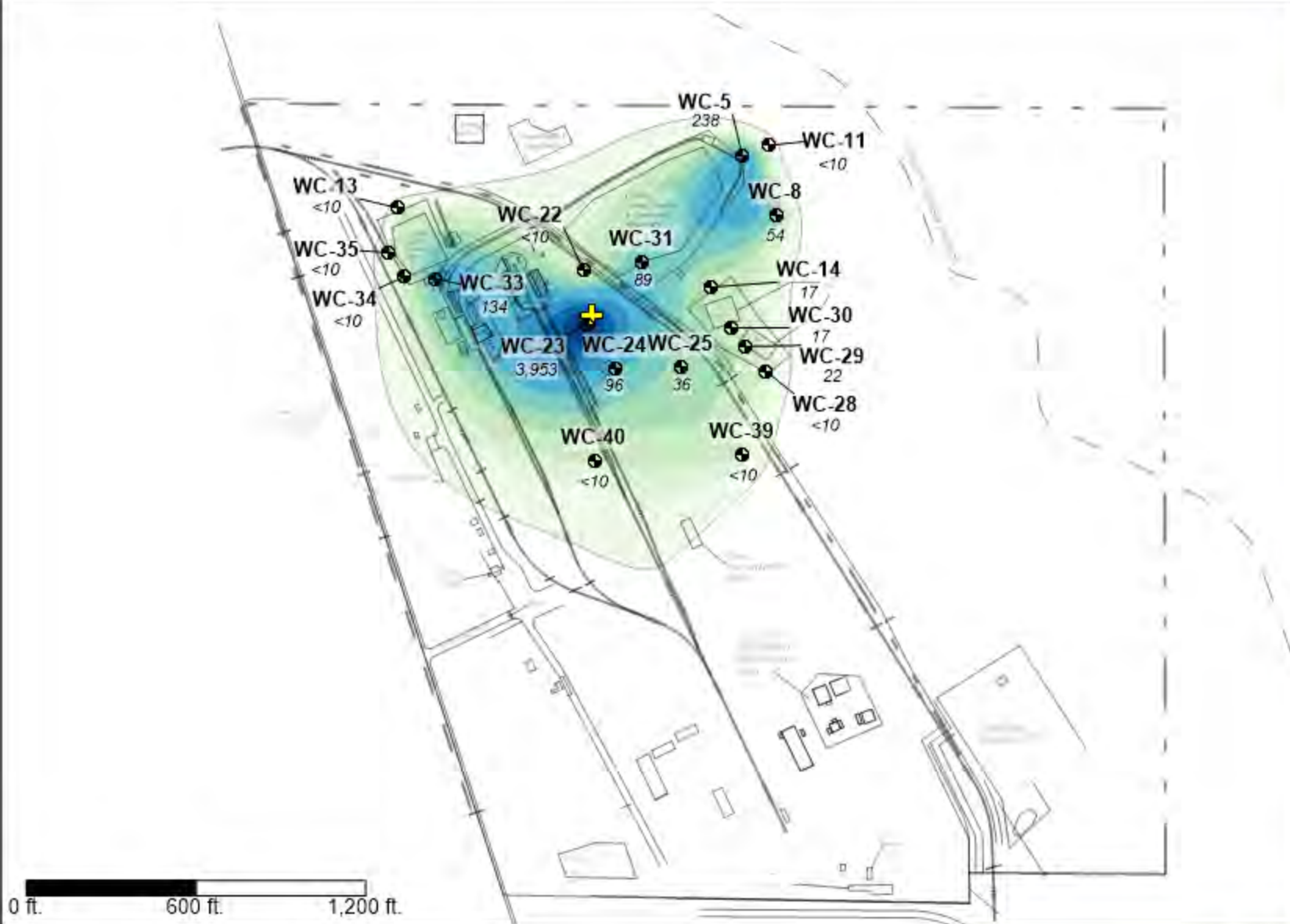
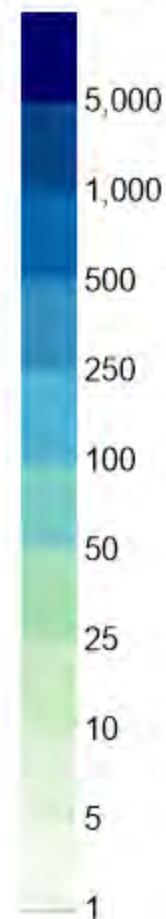
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **1992**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **42.2 acres**
Plume Average Concentration: **66.0 µg/L**
Plume Mass Indicator: **45.4 lbs**

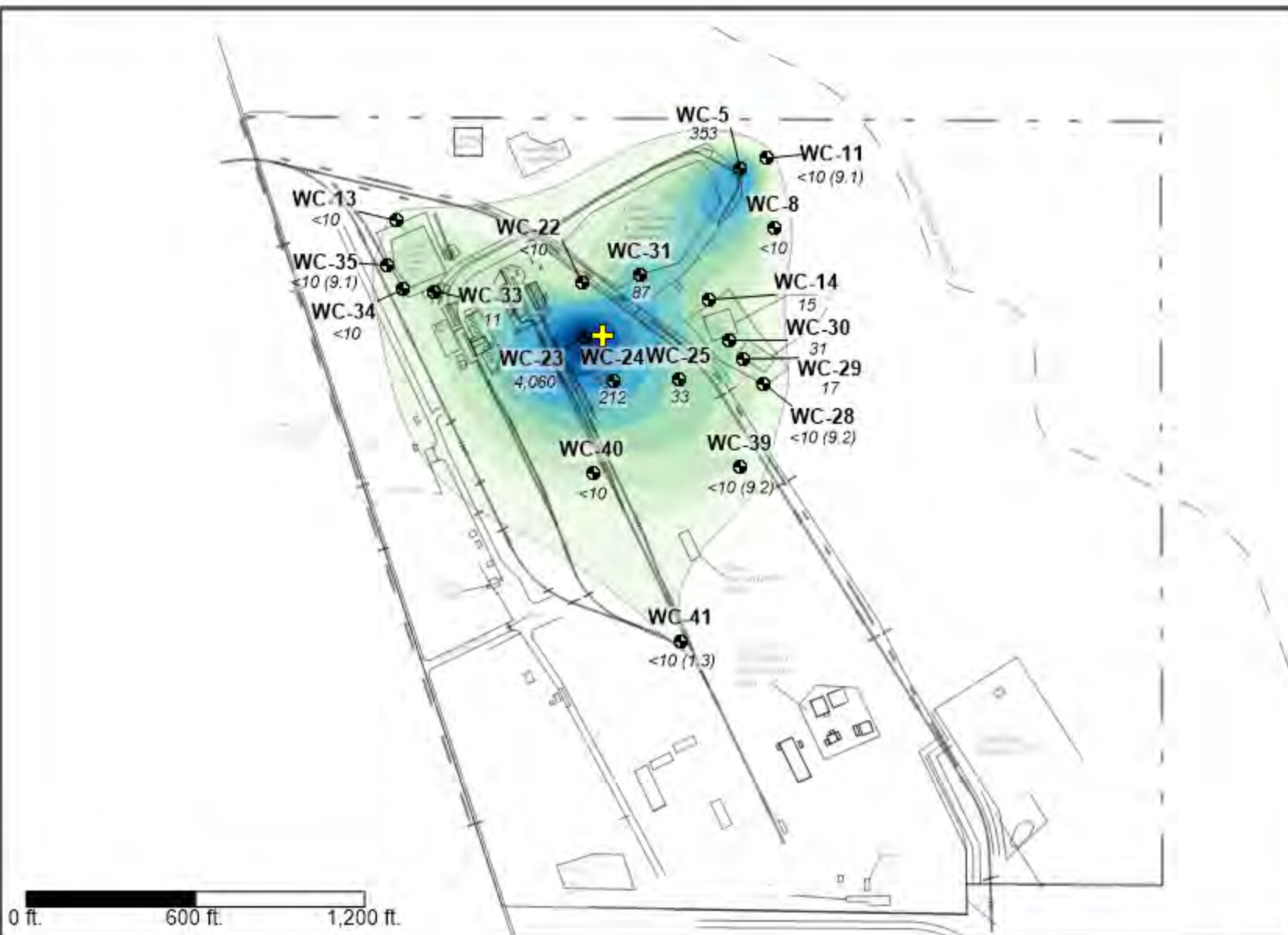
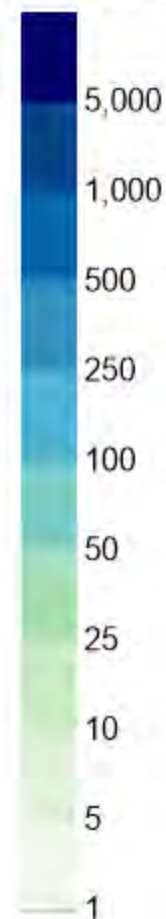
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS®**

Pentachlorophenol **1993**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **42.1 acres**
Plume Average Concentration: **59.3 µg/L**
Plume Mass Indicator: **40.8 lbs**

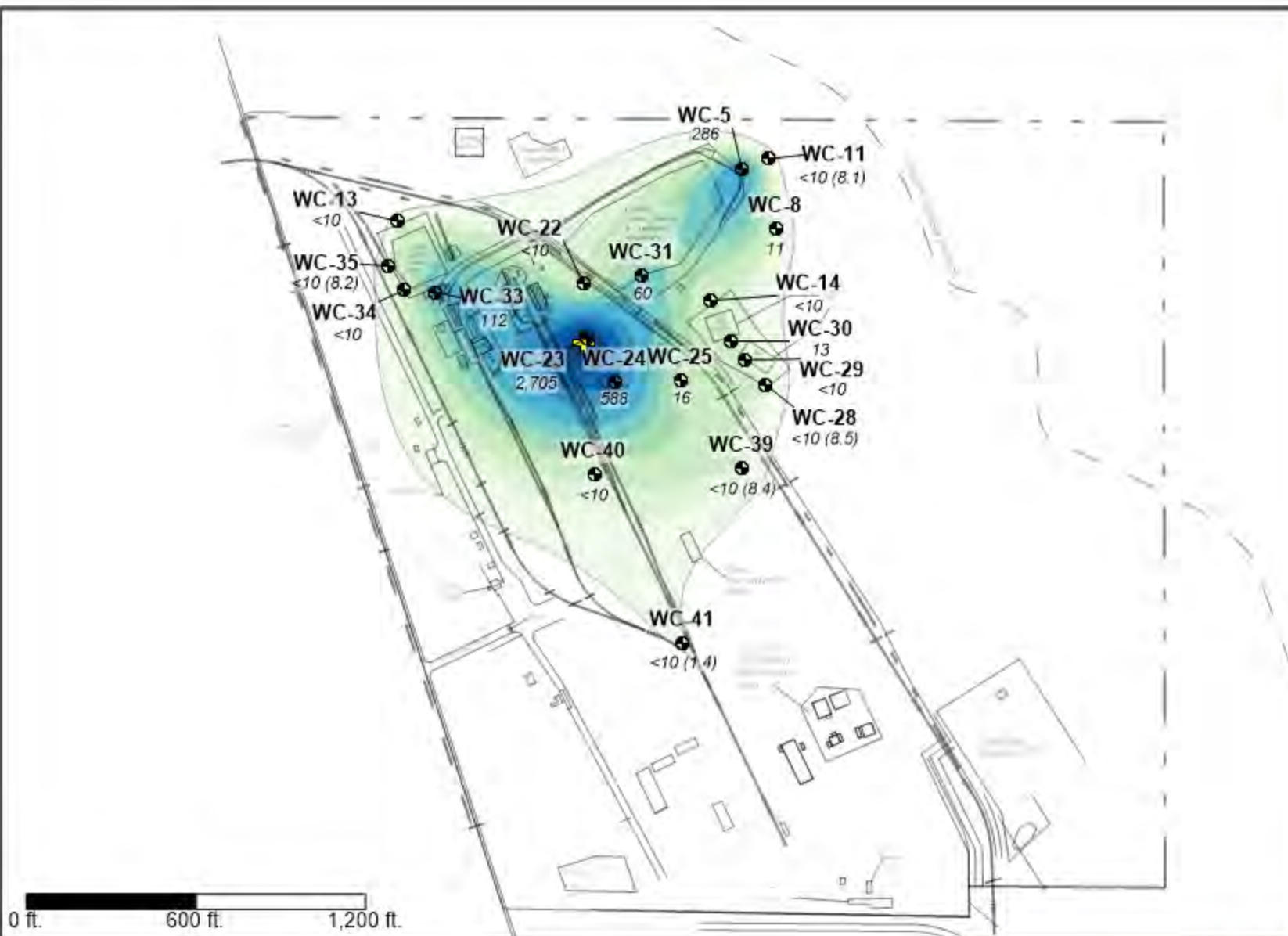
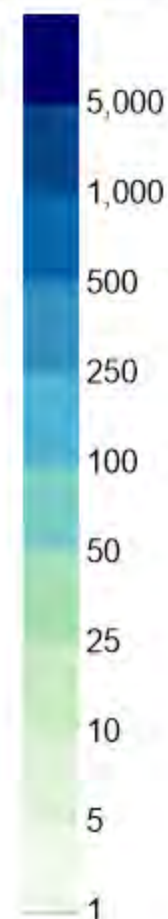
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **1994**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **43.1 acres**
Plume Average Concentration: **69.3 µg/L**
Plume Mass Indicator: **48.7 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

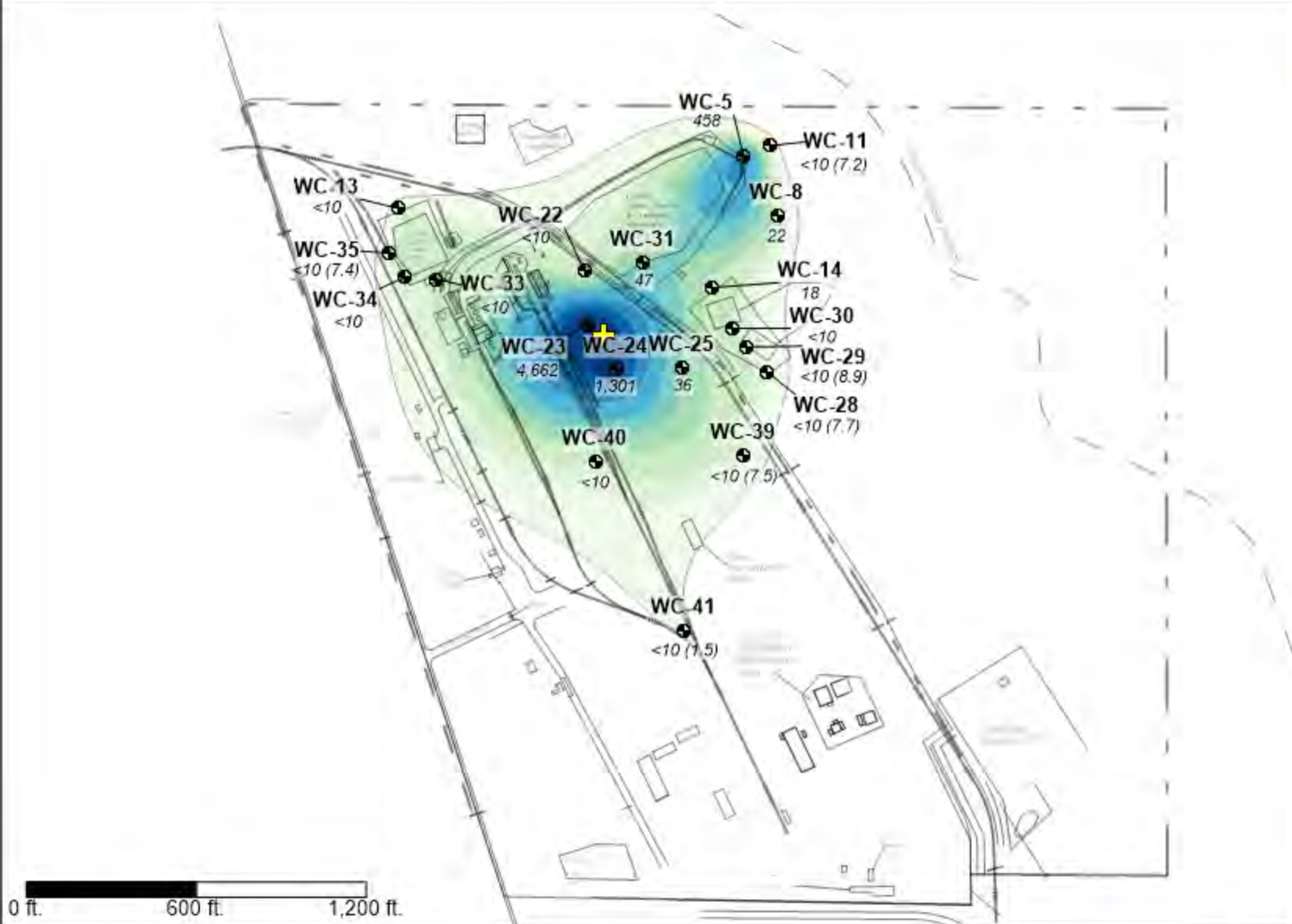
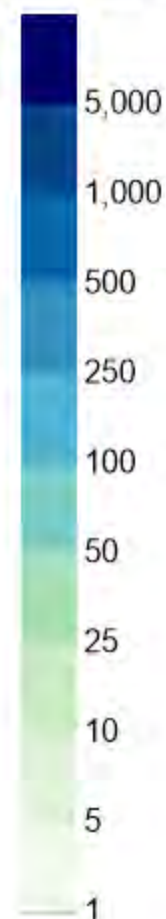


© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS®**

Pentachlorophenol

1995

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 42.2 acres
Plume Average Concentration: 92.8 µg/L
Plume Mass Indicator: 63.9 lbs

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



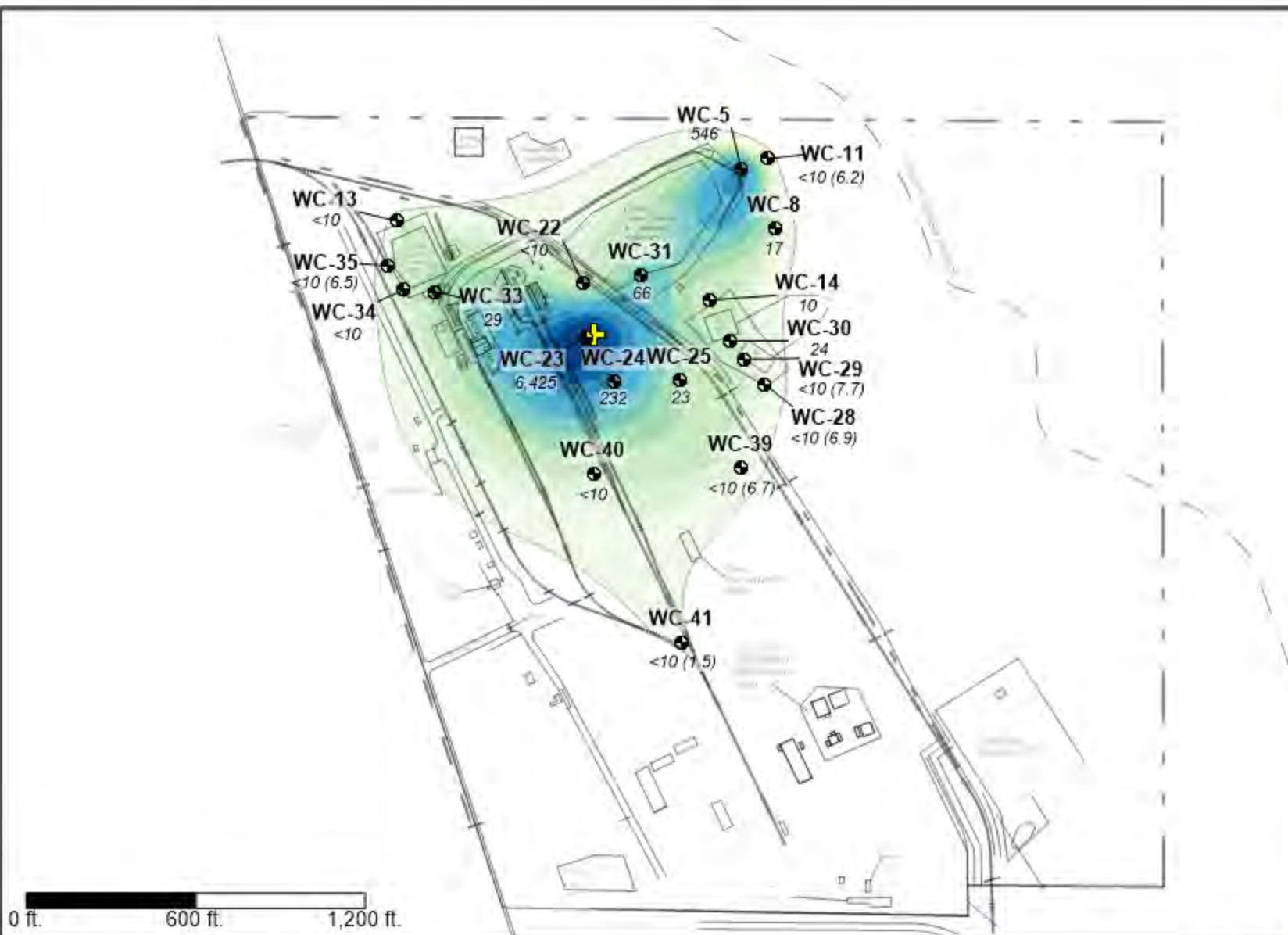
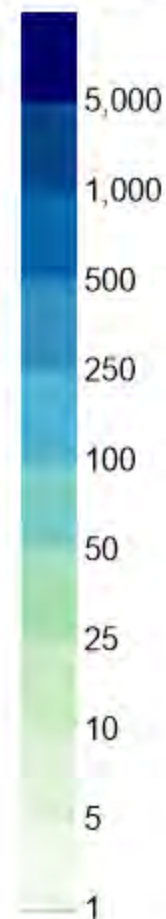
Environmental Challenges
BUSINESS SOLUTIONS®

© EarthCon 2020

Pentachlorophenol

1996

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **42.7 acres**
Plume Average Concentration: **75.9 µg/L**
Plume Mass Indicator: **52.9 lbs**

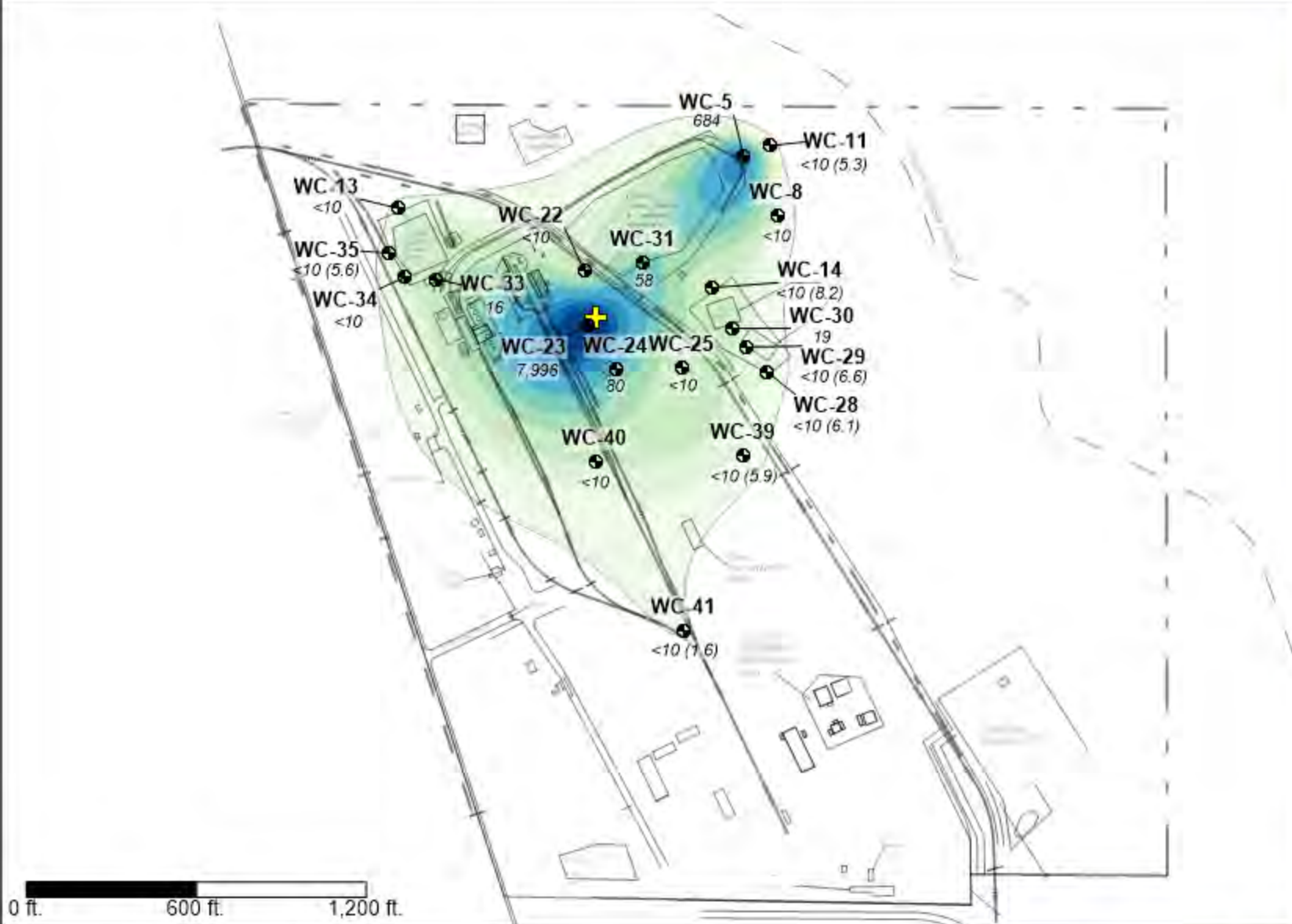
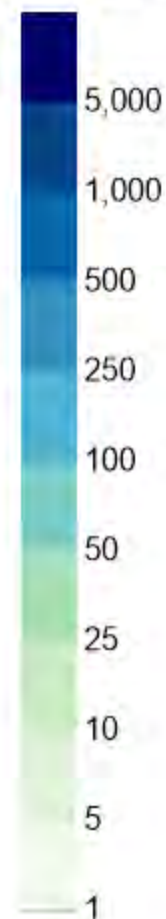
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges BUSINESS SOLUTIONS®

Pentachlorophenol **1997**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **42.4 acres**
Plume Average Concentration: **66.8 µg/L**
Plume Mass Indicator: **46.3 lbs**

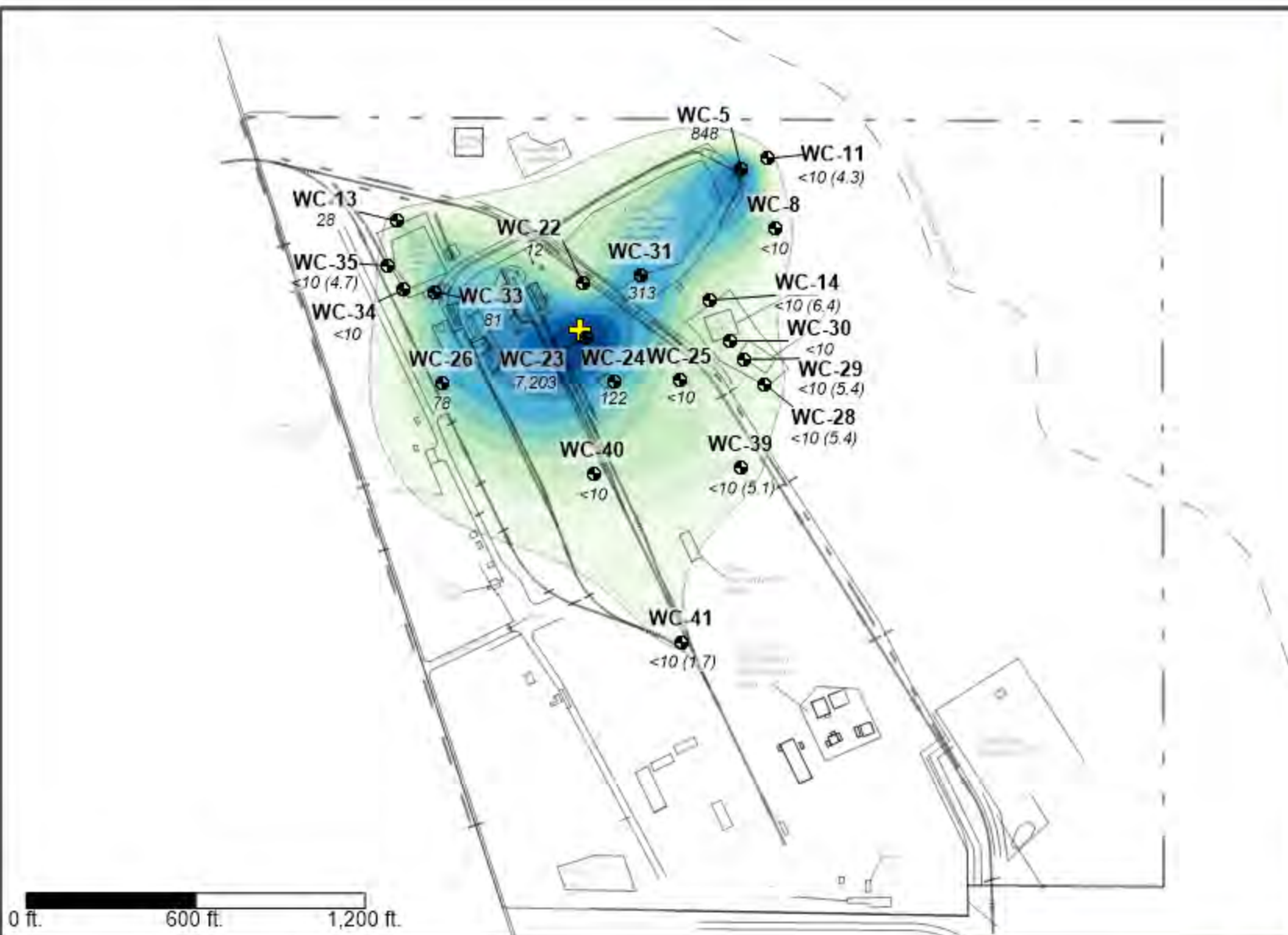
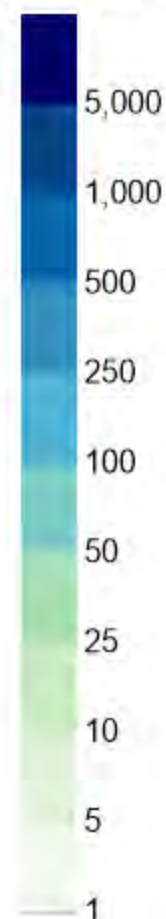
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **1998**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **44.6 acres**
Plume Average Concentration: **96.2 µg/L**
Plume Mass Indicator: **70.1 lbs**

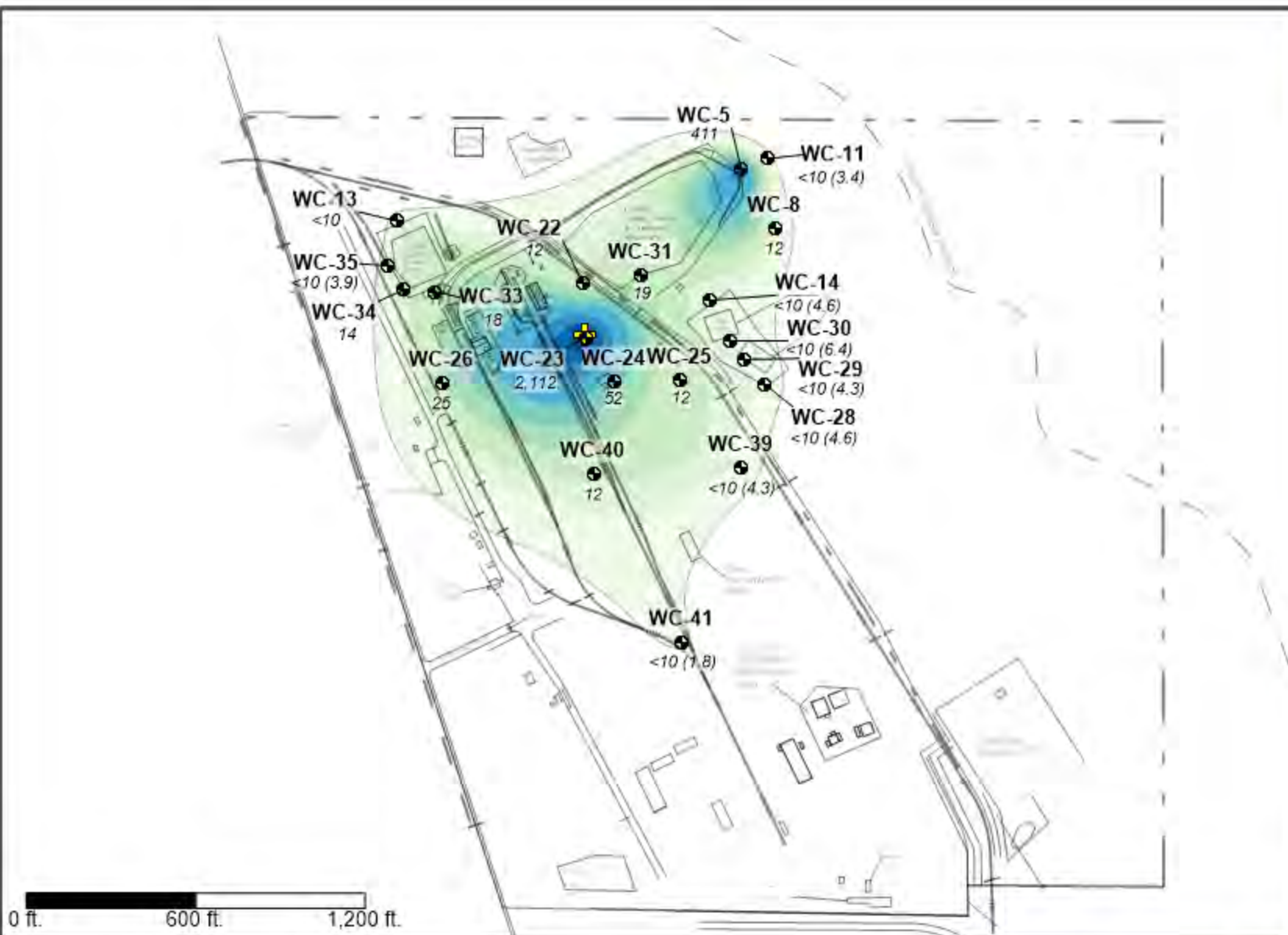
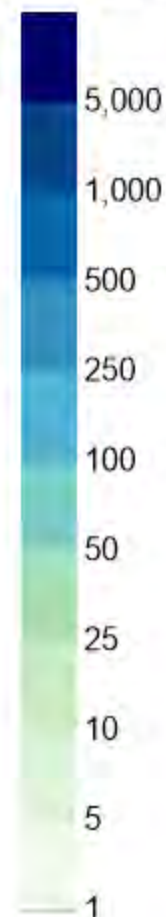
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **1999**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **43.1 acres**
Plume Average Concentration: **37.8 µg/L**
Plume Mass Indicator: **26.6 lbs**

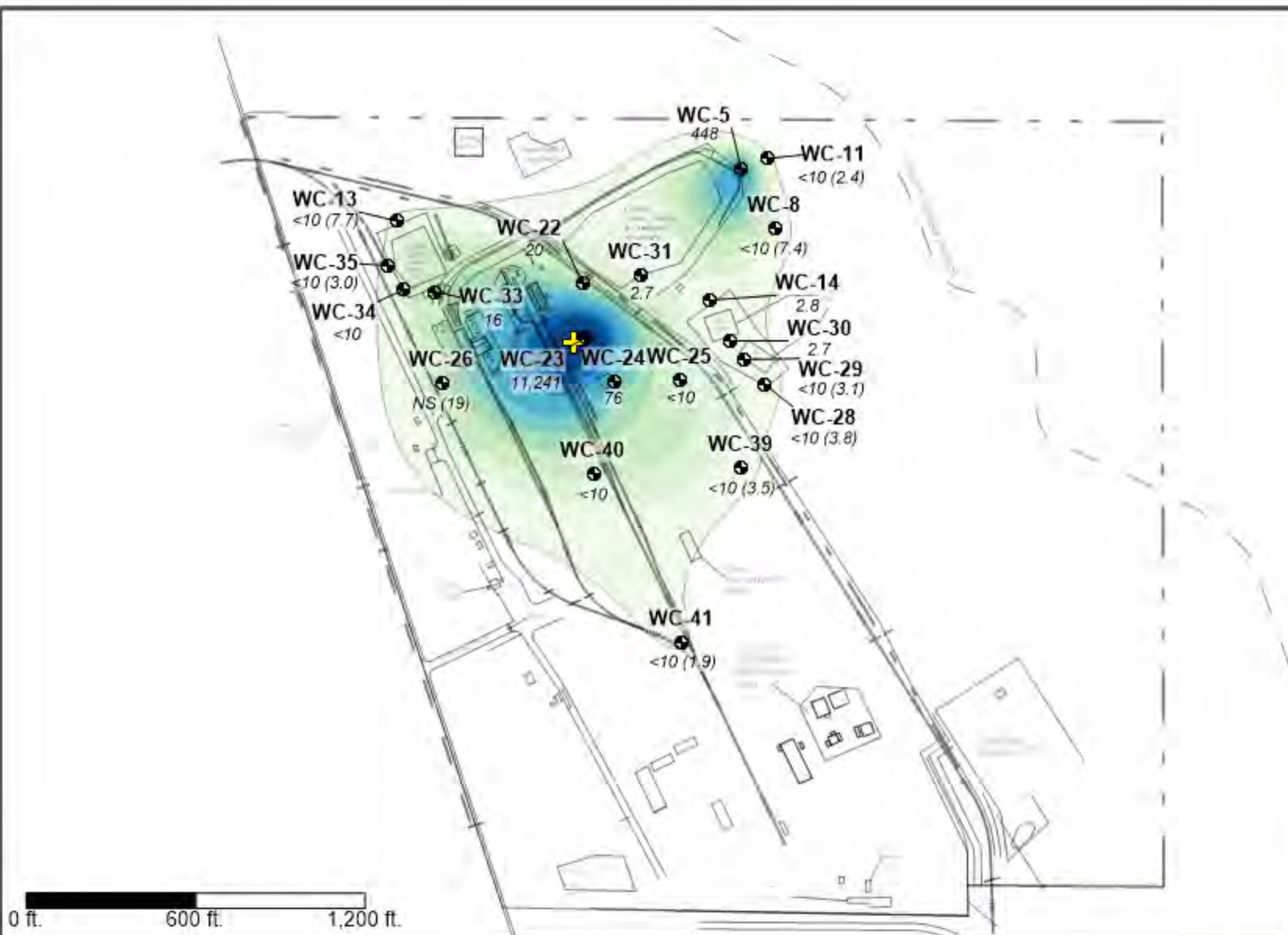
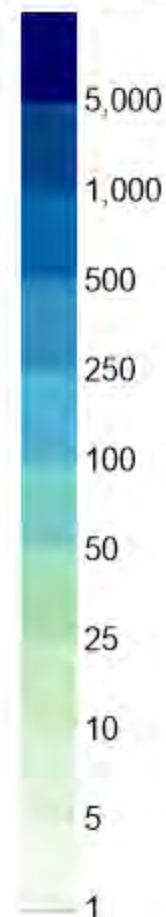
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **2000**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **41.9 acres**
Plume Average Concentration: **83.0 µg/L**
Plume Mass Indicator: **56.7 lbs**

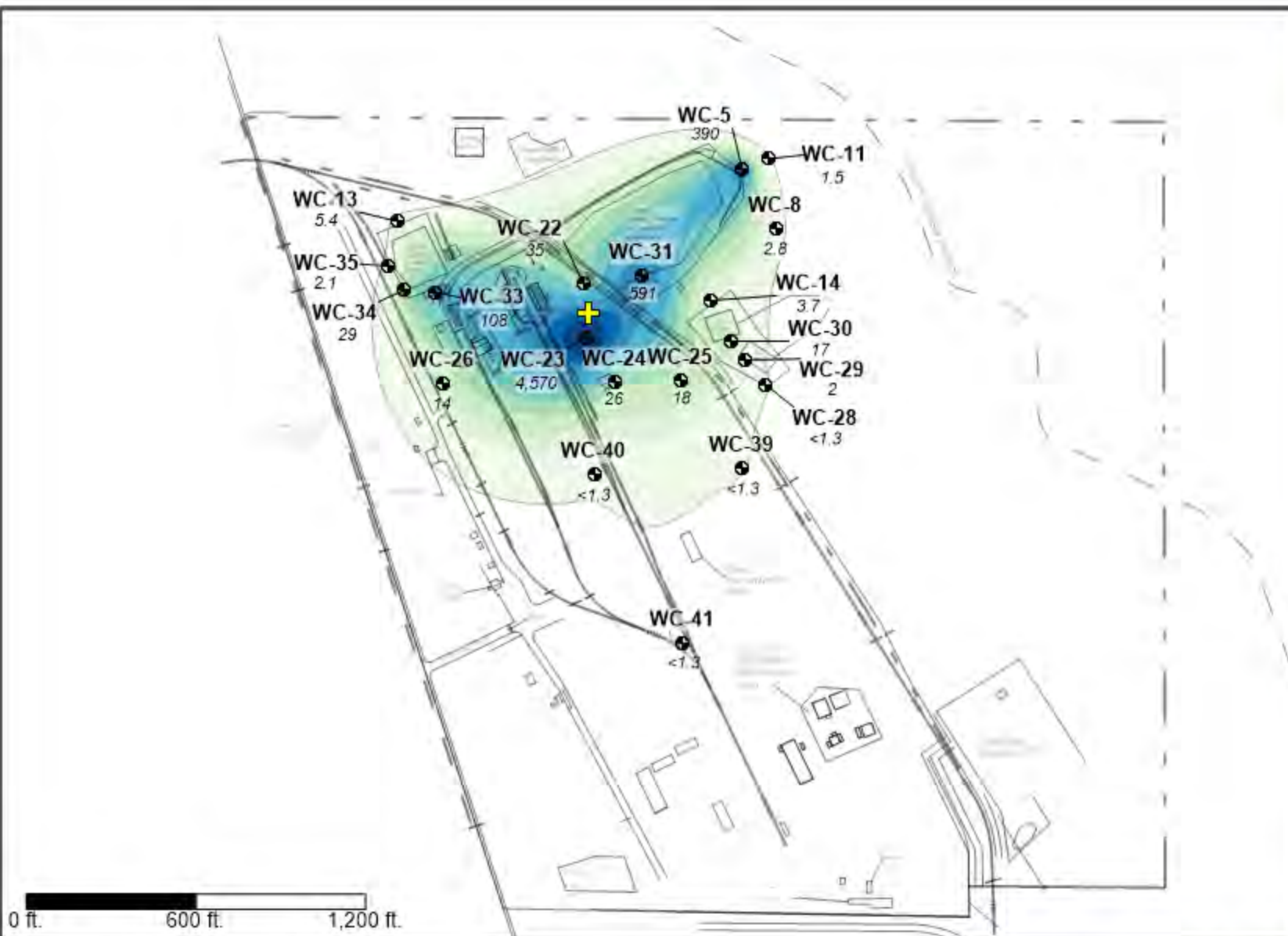
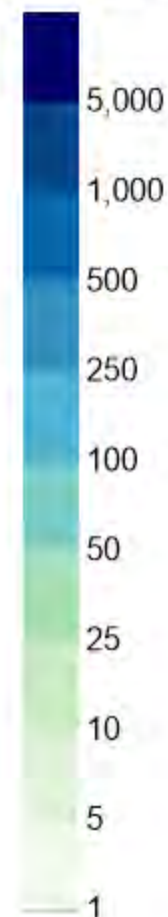
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **2001**

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **36.7 acres**
Plume Average Concentration: **75.1 µg/L**
Plume Mass Indicator: **44.9 lbs**

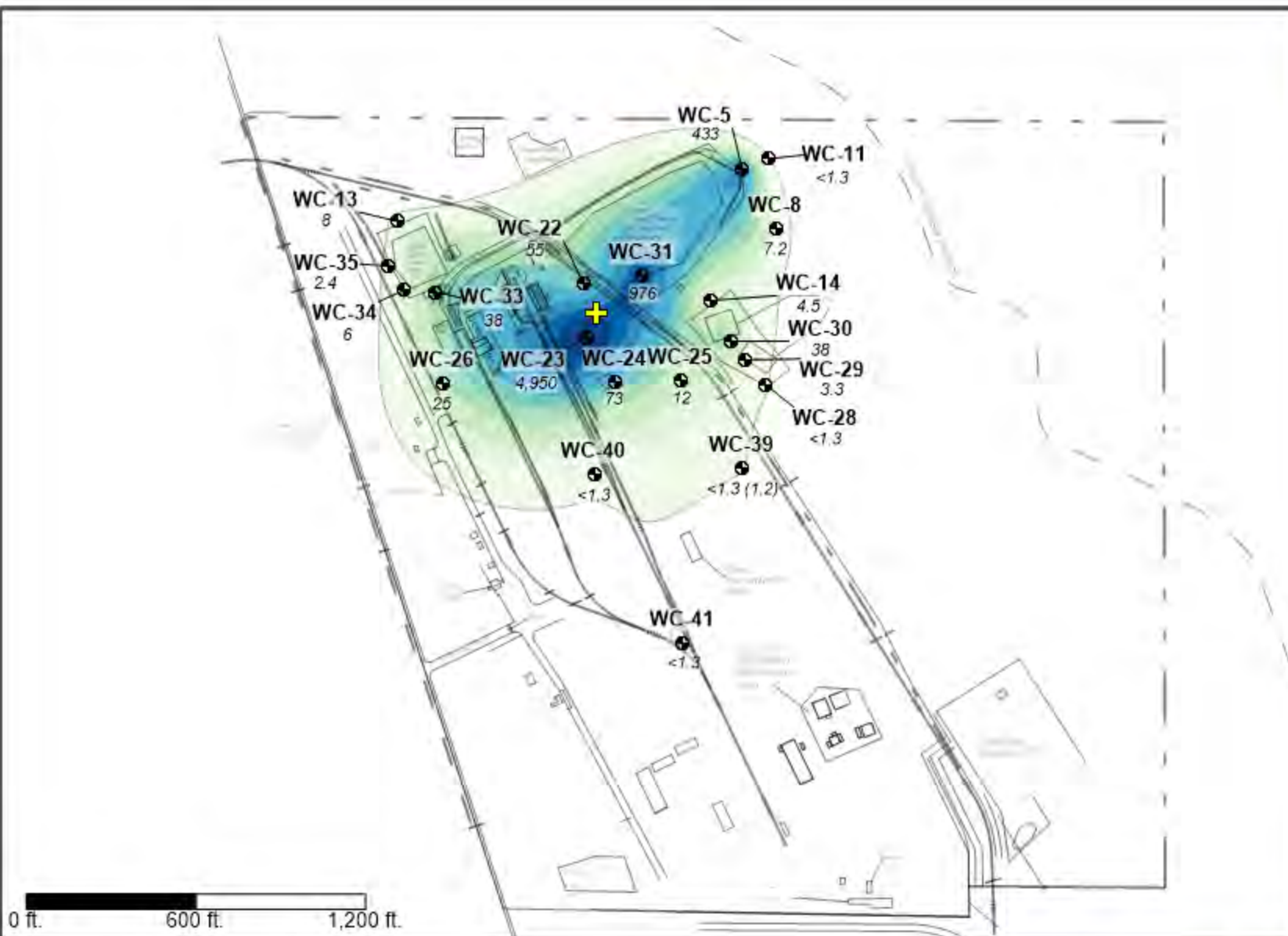
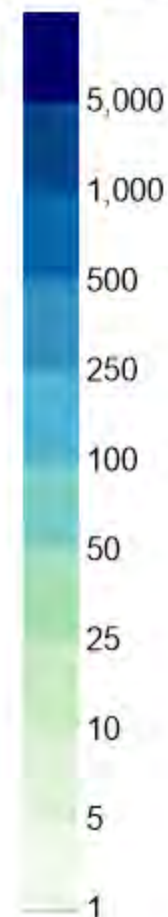
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2002**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **37.3 acres**
Plume Average Concentration: **95.3 µg/L**
Plume Mass Indicator: **58.0 lbs**

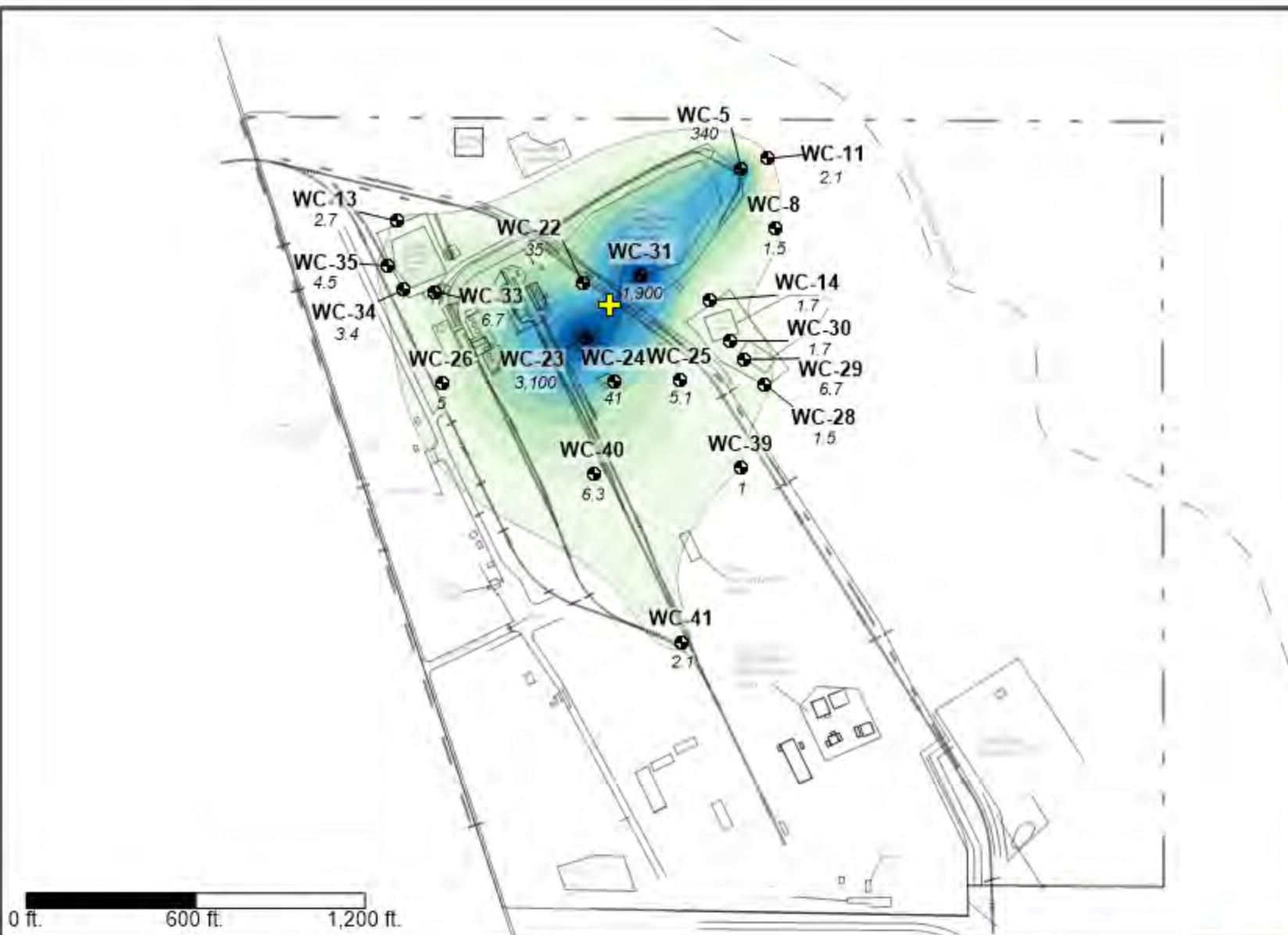
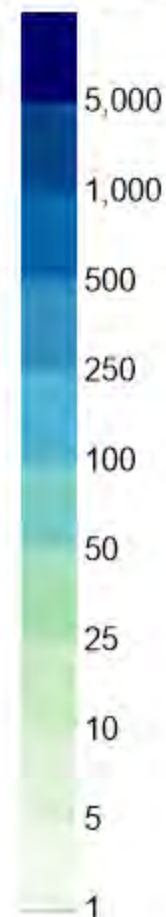
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2003**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **39.0 acres**
Plume Average Concentration: **62.8 µg/L**
Plume Mass Indicator: **39.9 lbs**

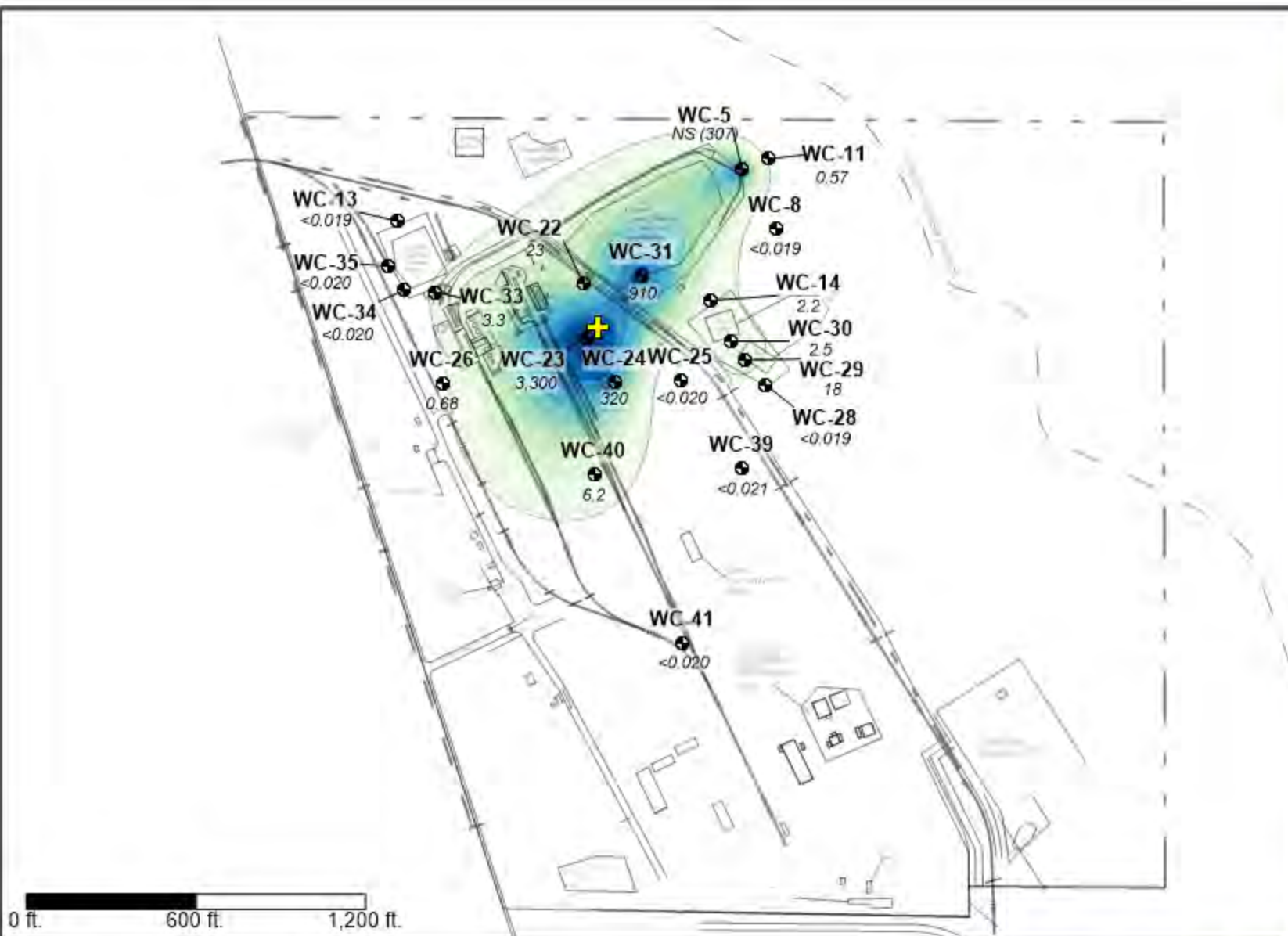
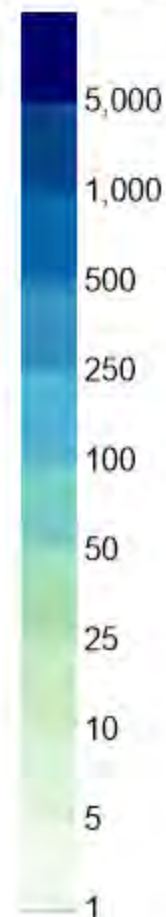
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2004**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **25.0 acres**
Plume Average Concentration: **86.5 µg/L**
Plume Mass Indicator: **35.3 lbs**

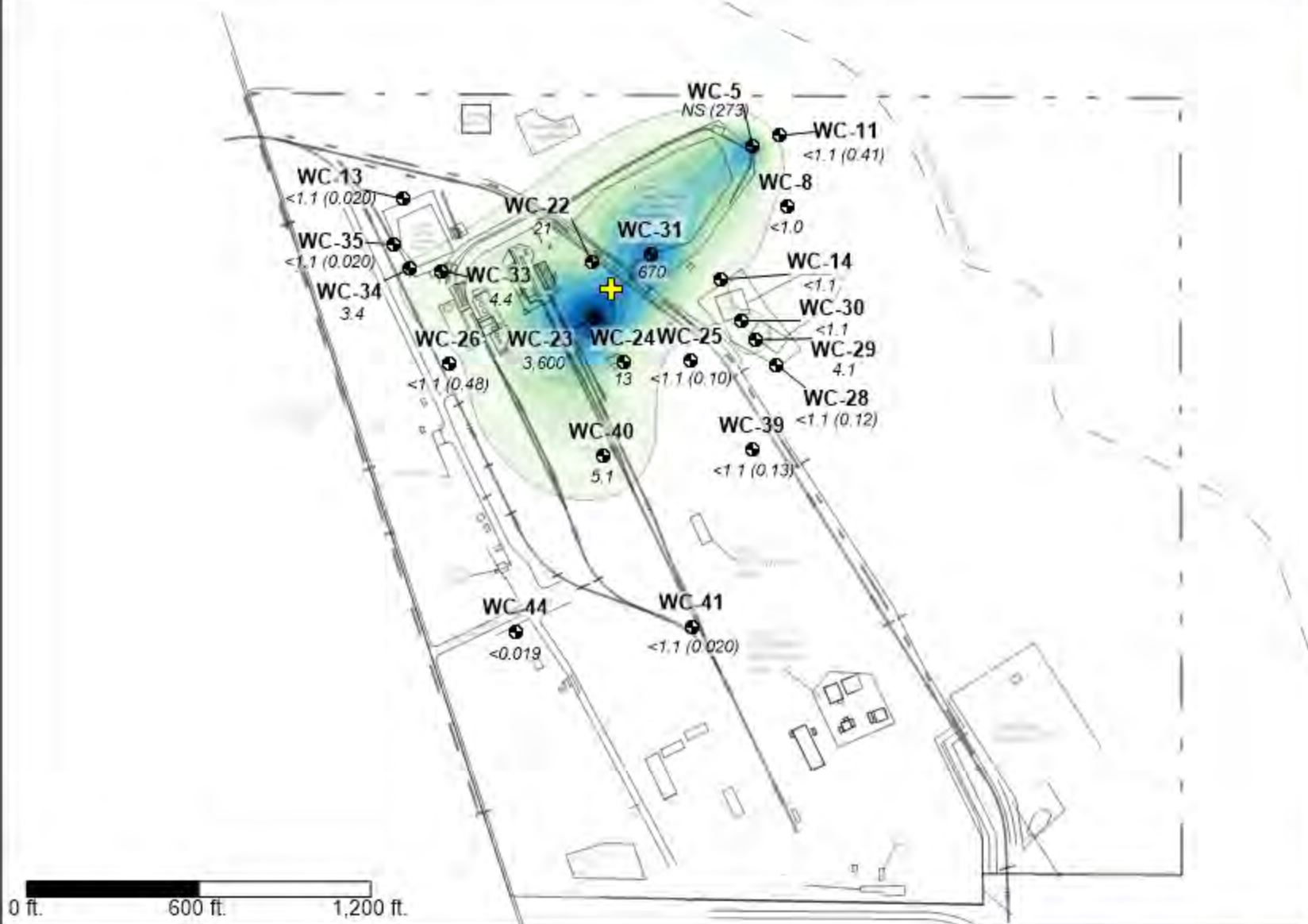
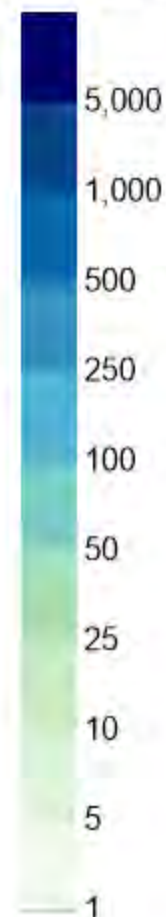
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2005**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (146) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **25.1 acres**
Plume Average Concentration: **55.7 µg/L**
Plume Mass Indicator: **22.8 lbs**

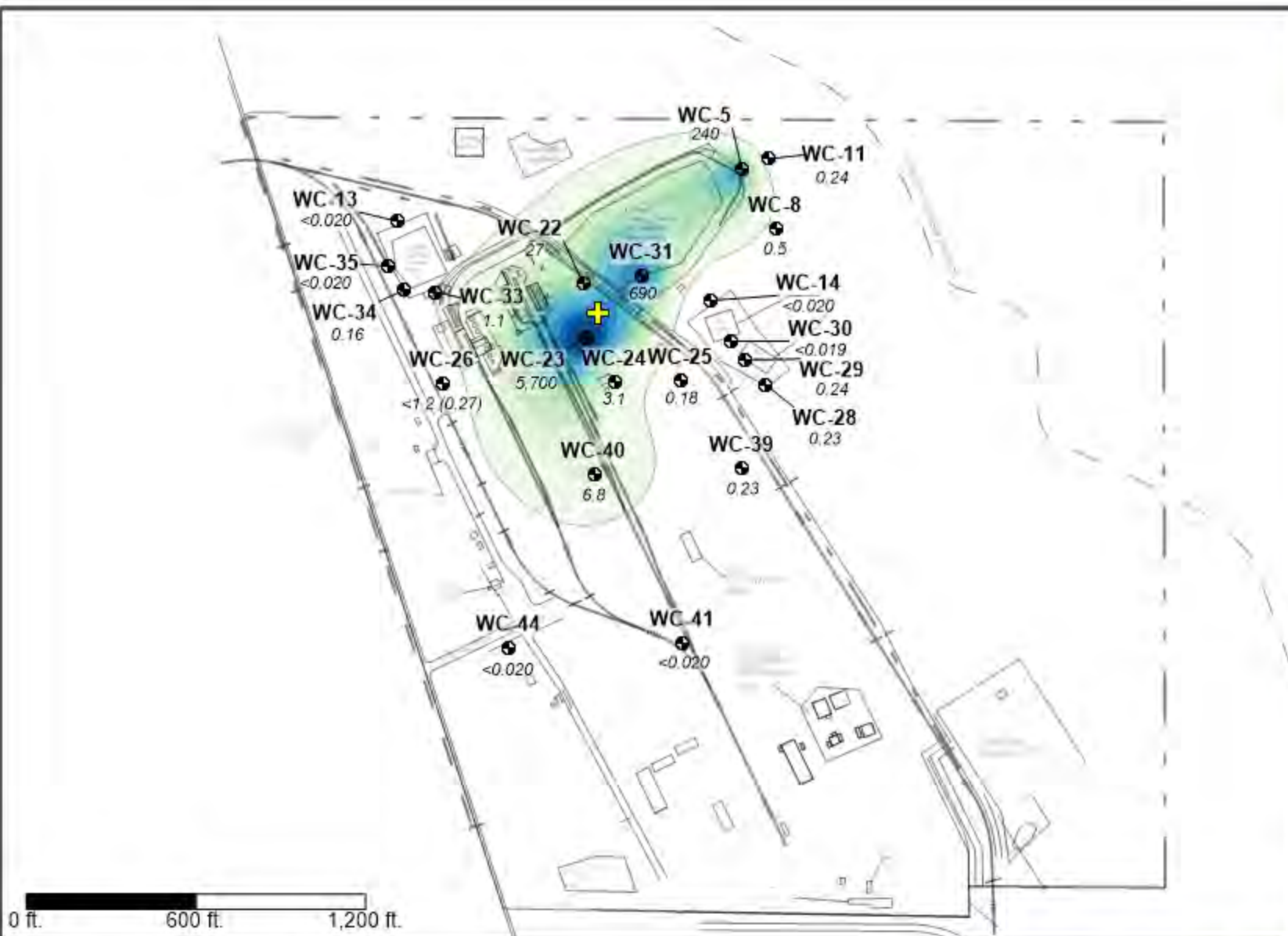
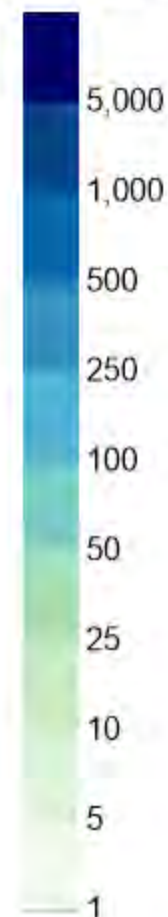
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2006**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **22.2 acres**
Plume Average Concentration: **63.5 µg/L**
Plume Mass Indicator: **23.0 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

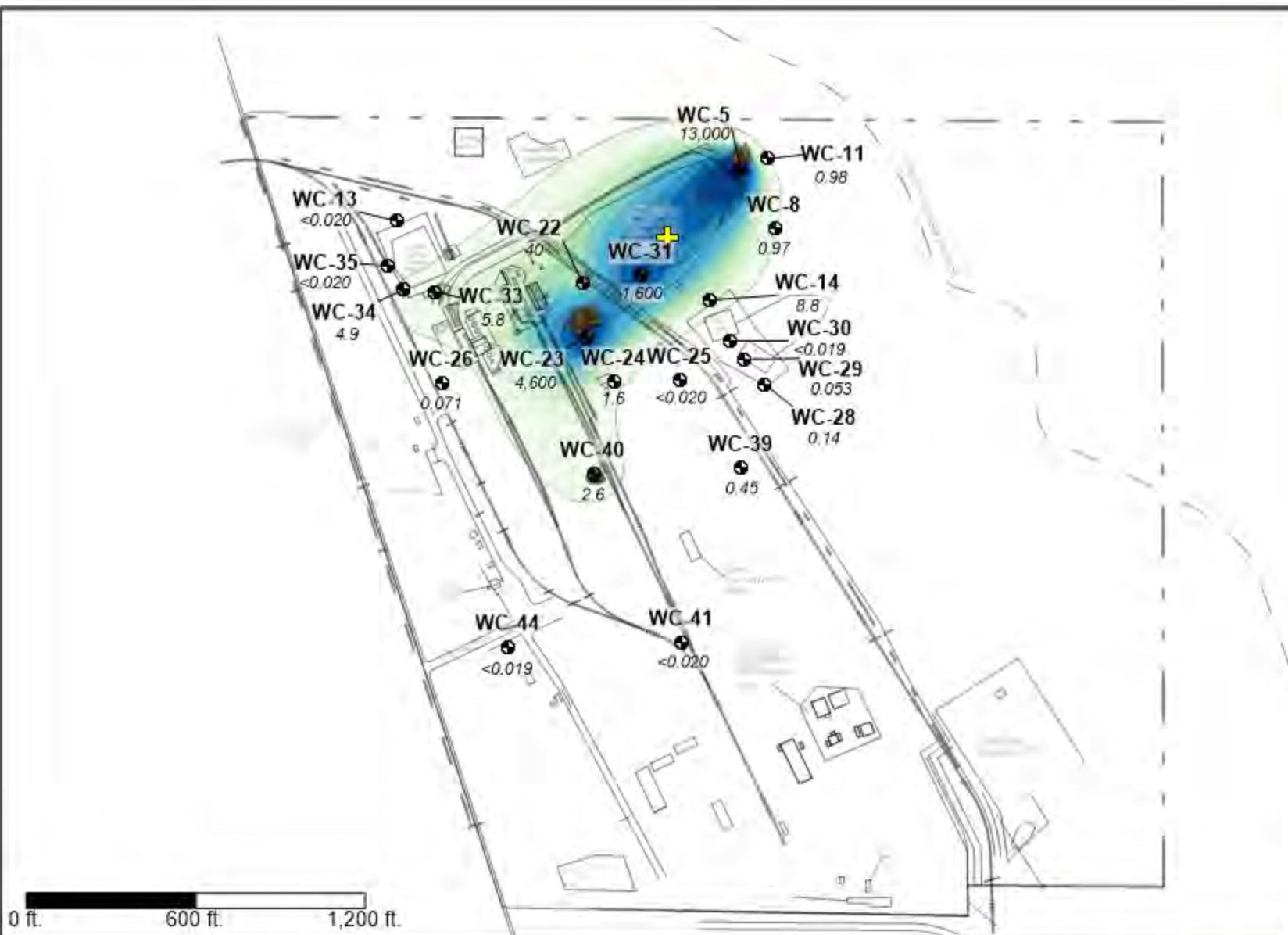
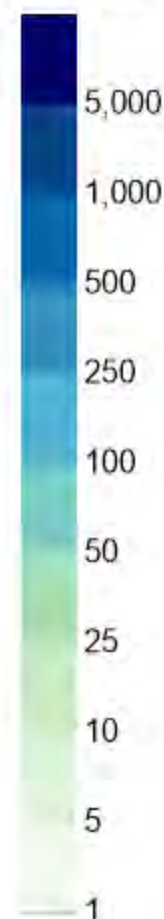


Environmental Challenges
BUSINESS SOLUTIONS®

© EarthCon 2020

Pentachlorophenol **2007**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **22.9 acres**
Plume Average Concentration: **182 µg/L**
Plume Mass Indicator: **68.0 lbs**

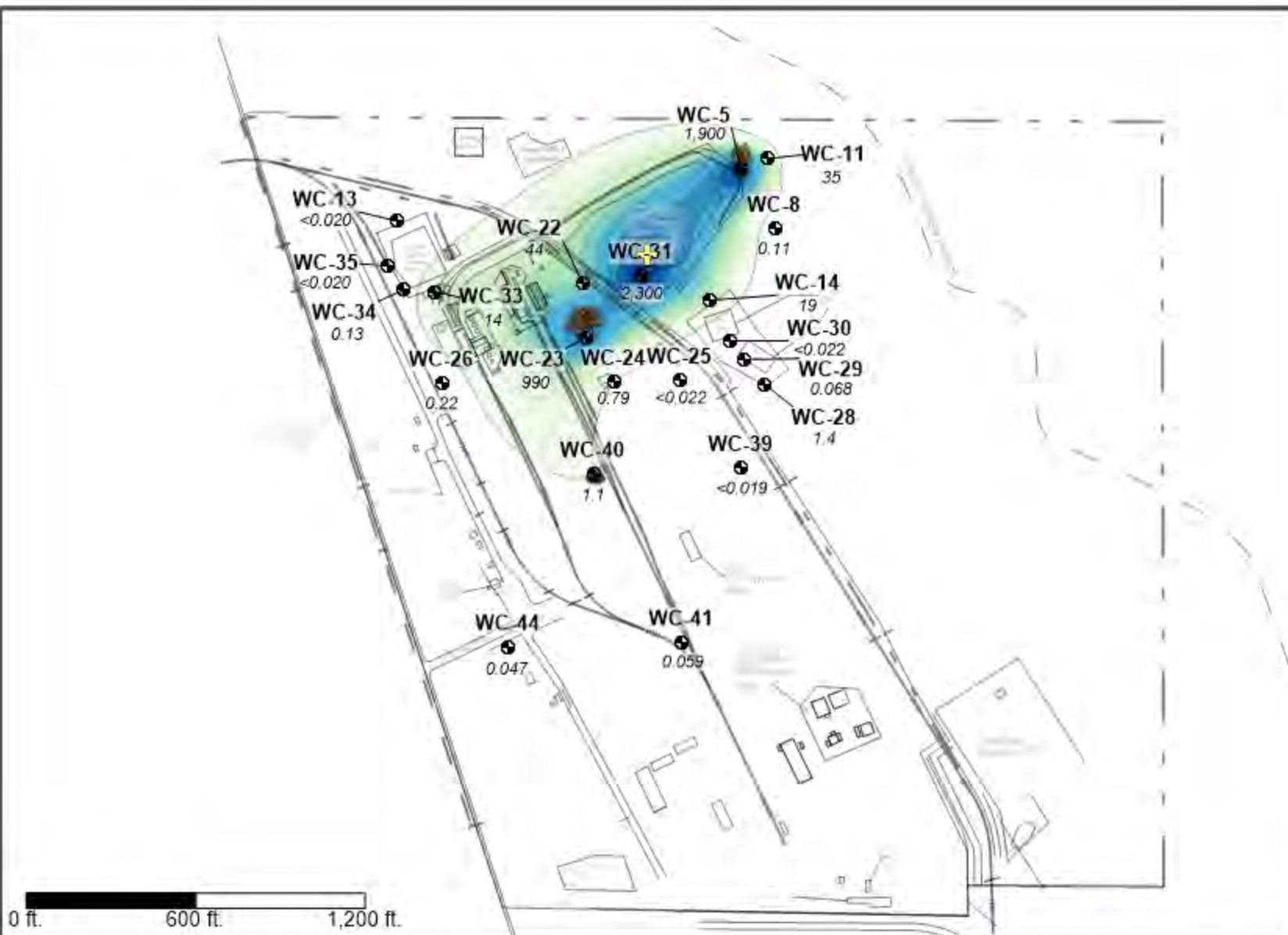
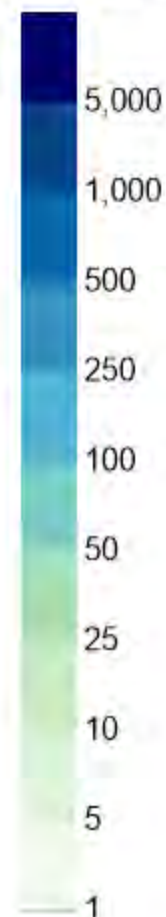
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **2008**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **21.7 acres**
Plume Average Concentration: **103 µg/L**
Plume Mass Indicator: **36.3 lbs**

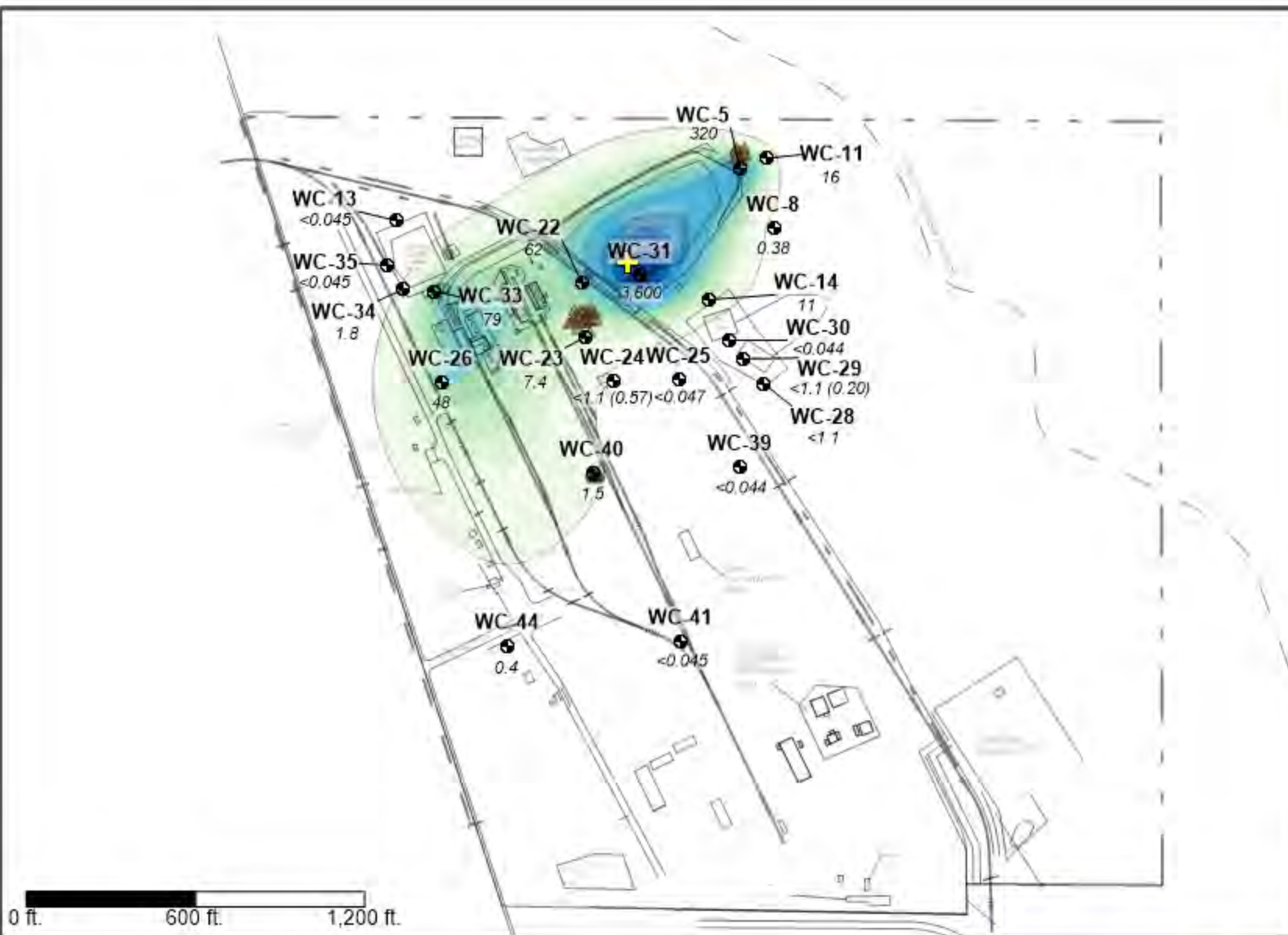
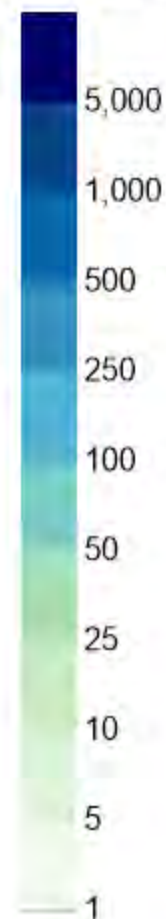
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2009**

Concentration (µg/L)



LEGEND

- Monitoring Well
- Concentration (µg/L)
- Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 30.6 acres
Plume Average Concentration: 68.7 µg/L
Plume Mass Indicator: 34.2 lbs

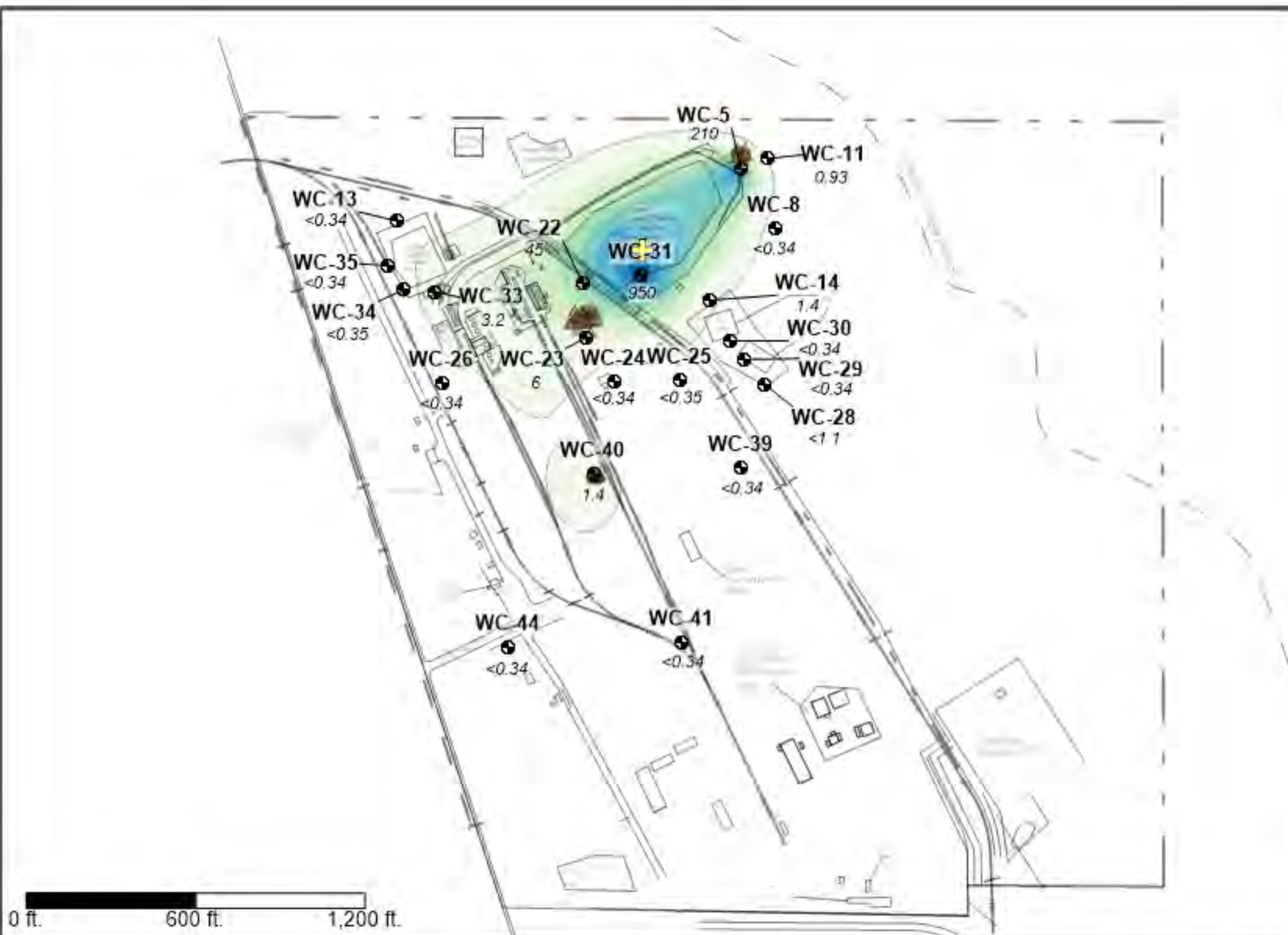
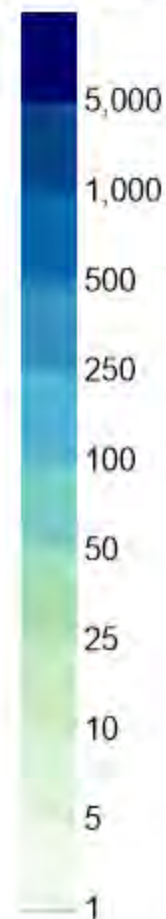
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2010**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **20.4 acres**
Plume Average Concentration: **33.3 µg/L**
Plume Mass Indicator: **11.1 lbs**

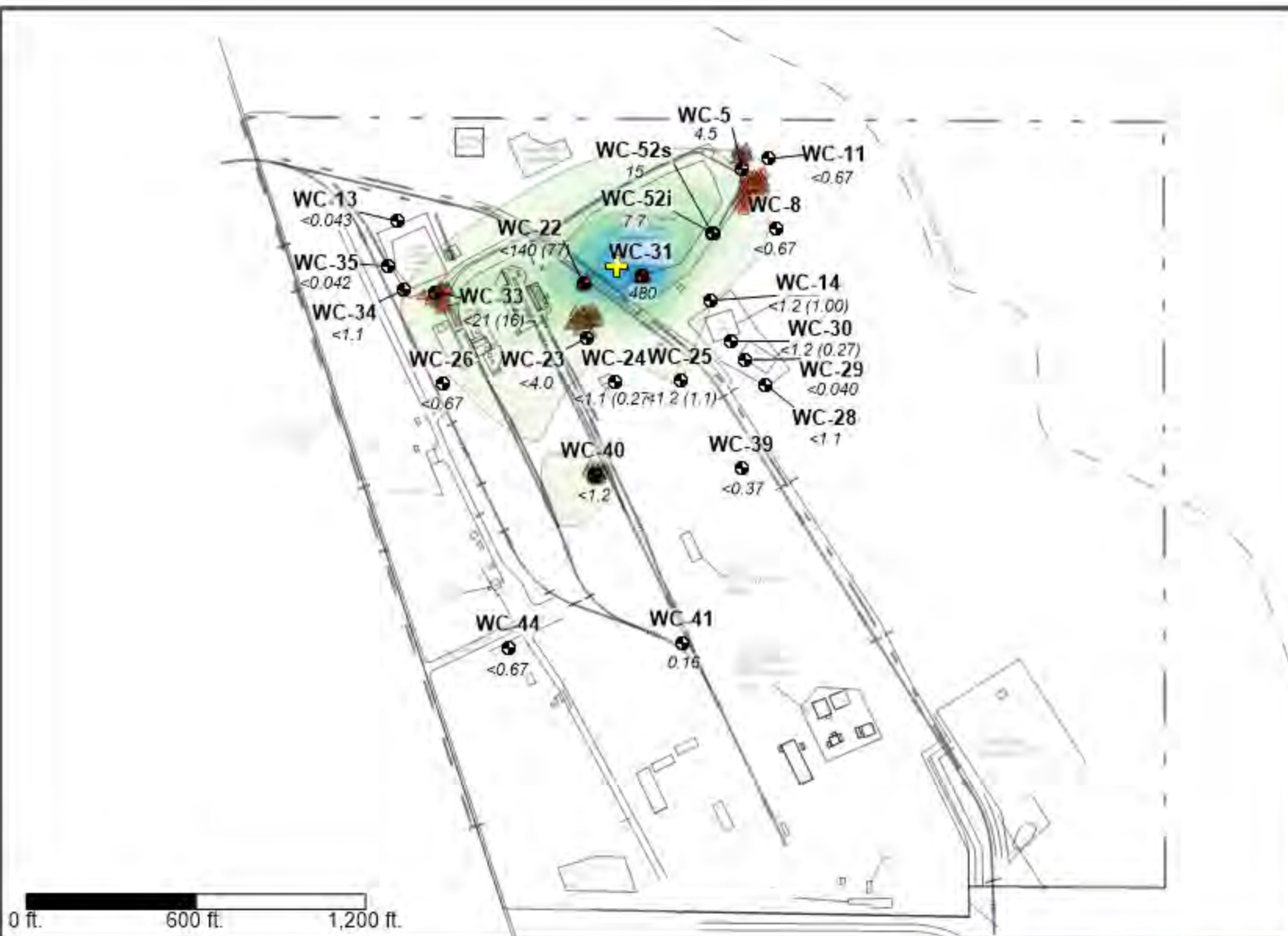
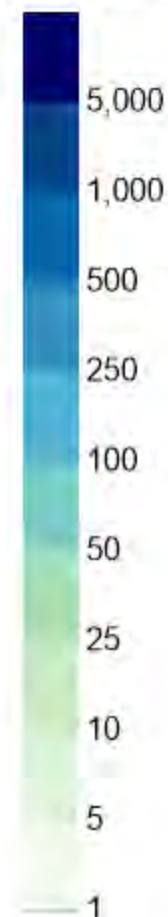
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol 2011

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: 20.6 acres
Plume Average Concentration: 19.8 µg/L
Plume Mass Indicator: 6.6 lbs

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

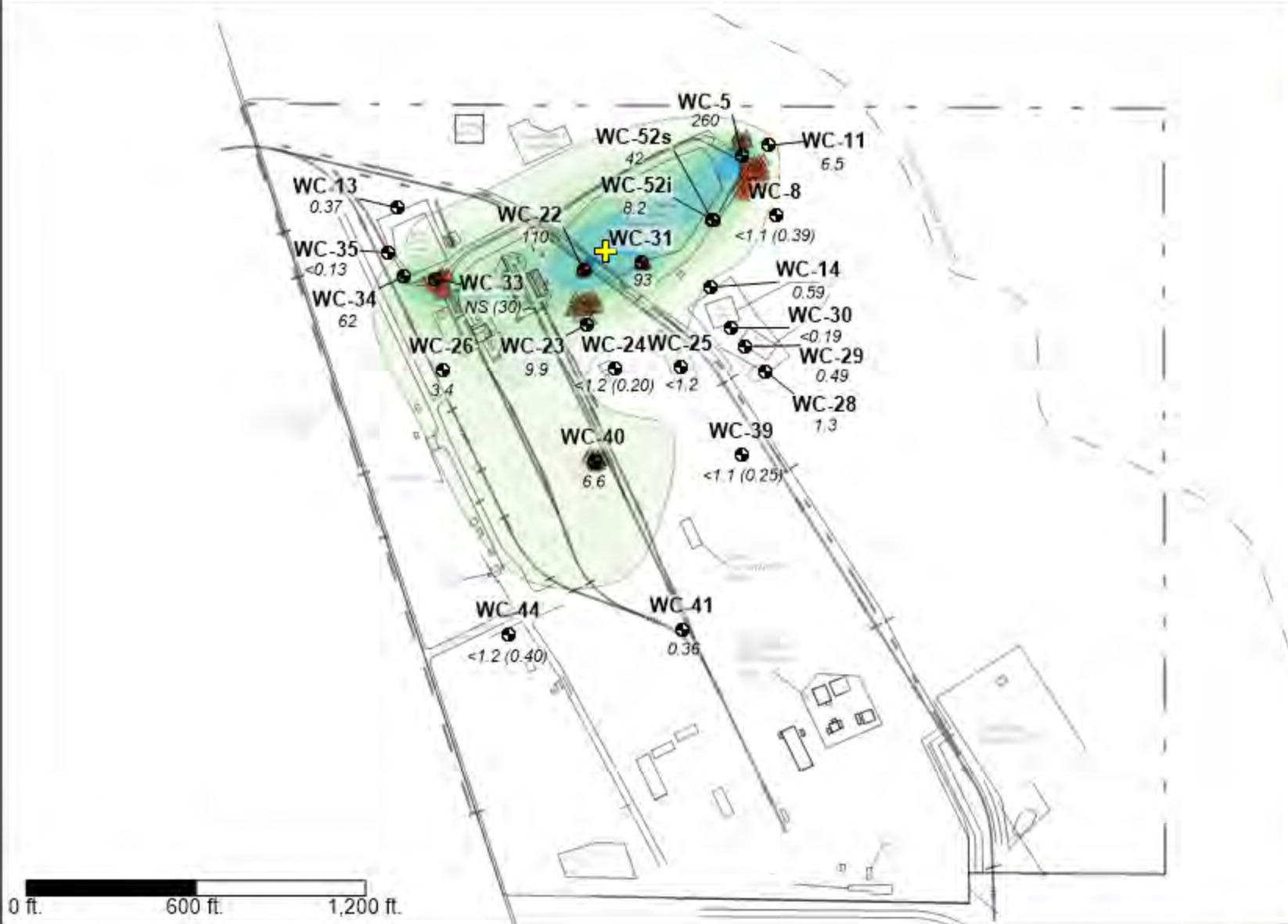
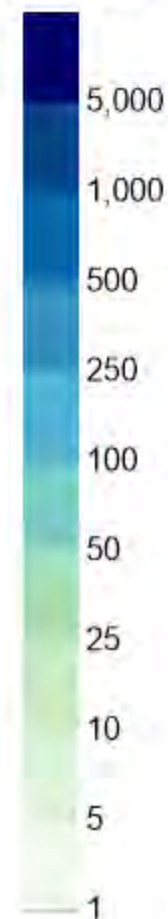


Environmental Challenges
BUSINESS SOLUTIONS®

© EarthCon 2020

Pentachlorophenol **2012**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- ⊕ Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **33.4 acres**
Plume Average Concentration: **16.1 µg/L**
Plume Mass Indicator: **8.8 lbs**

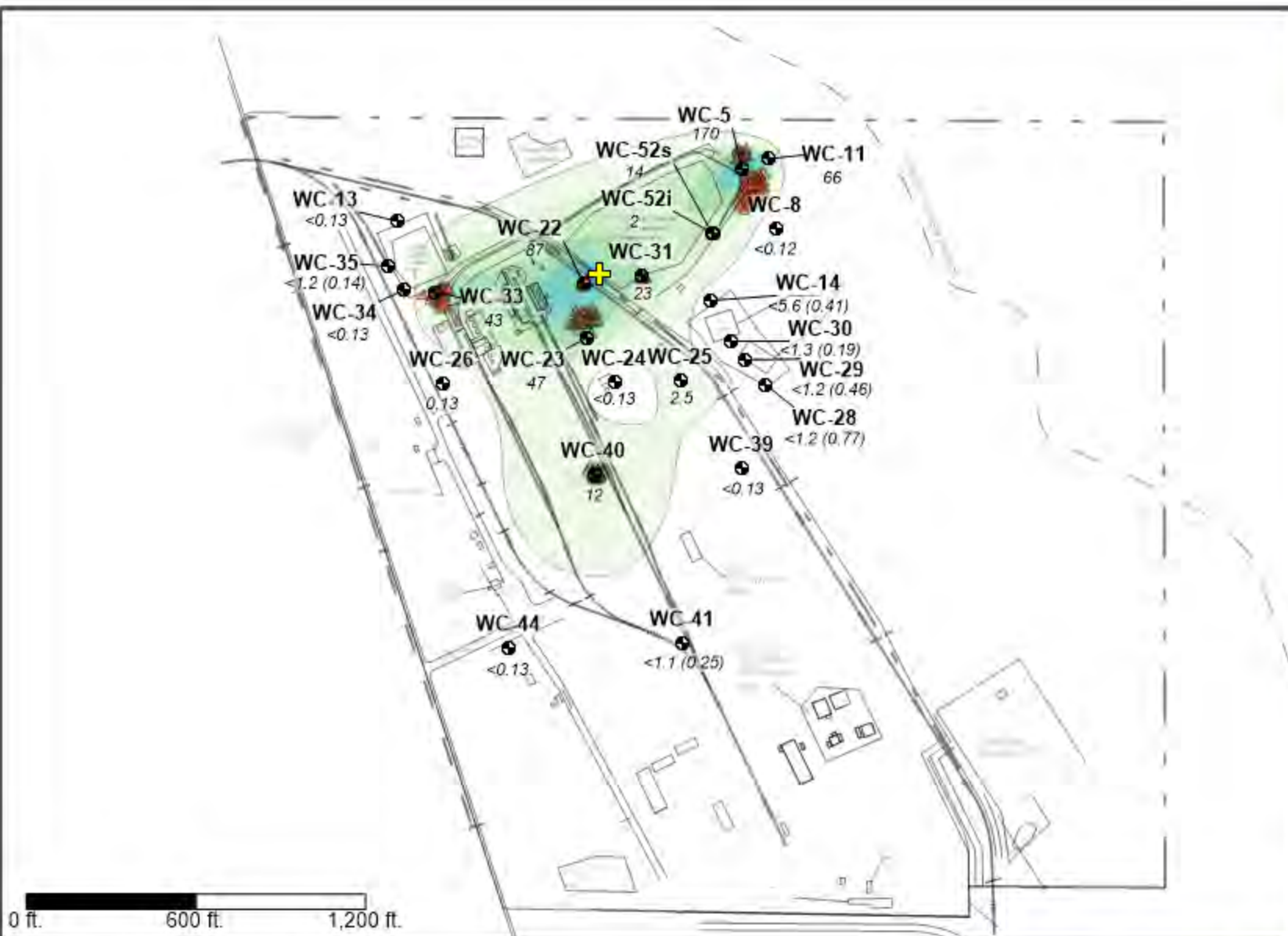
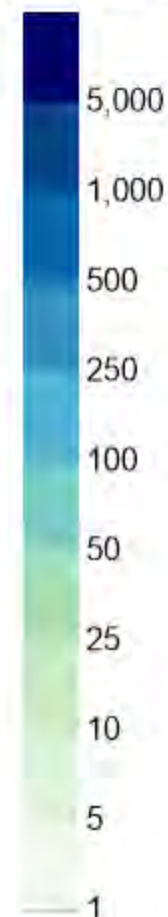
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2013**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (140) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **27.0 acres**
Plume Average Concentration: **13.0 µg/L**
Plume Mass Indicator: **5.7 lbs**

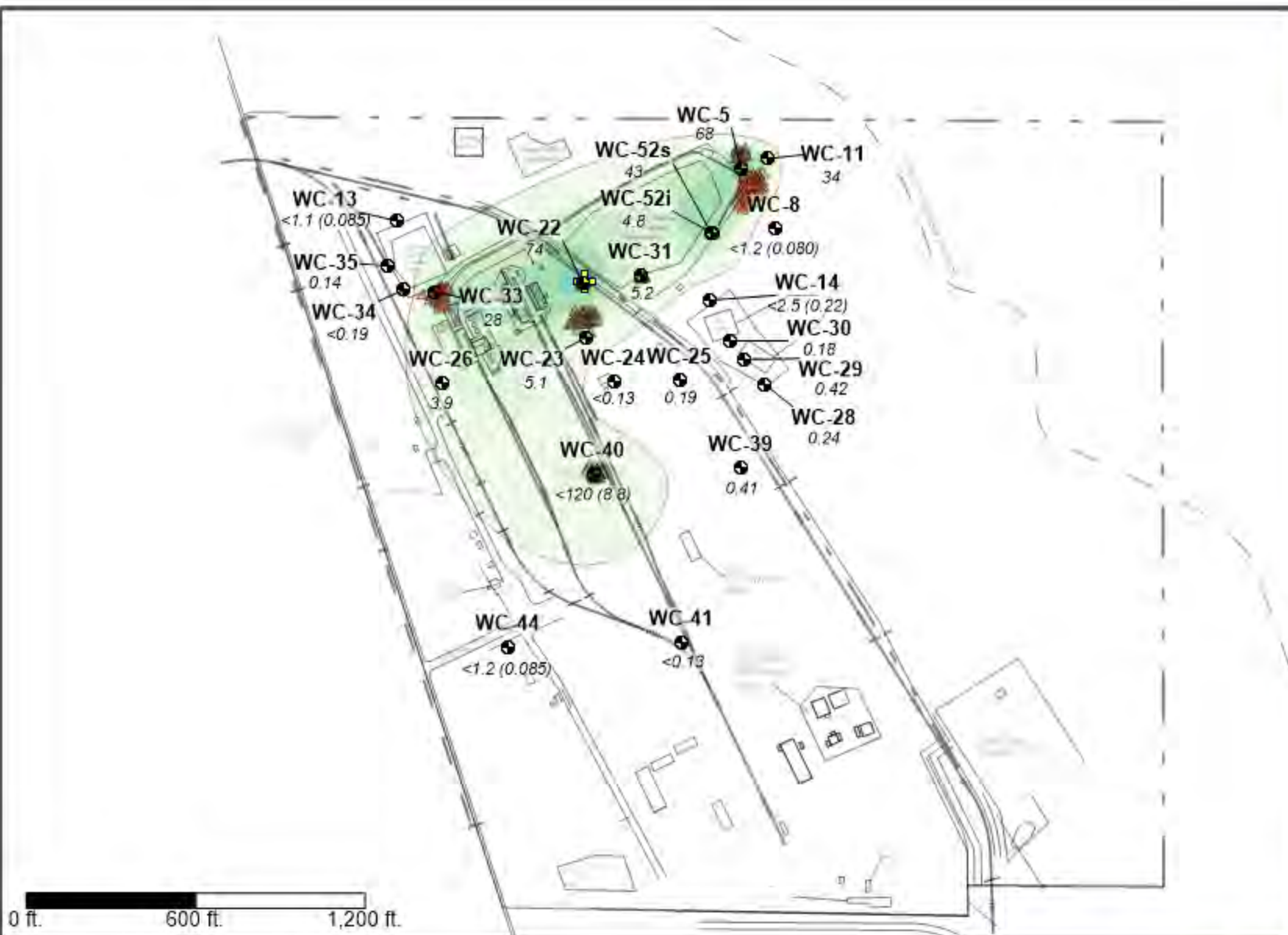
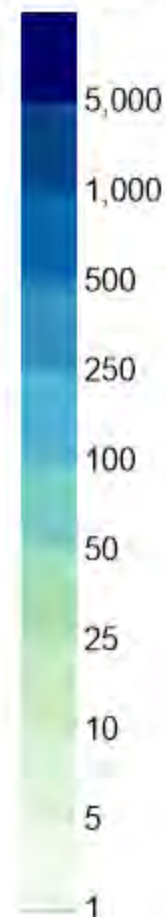
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2014**

Concentration (µg/L)



0 ft. 600 ft. 1,200 ft.

LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (146) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **26.9 acres**
Plume Average Concentration: **10.0 µg/L**
Plume Mass Indicator: **4.4 lbs**

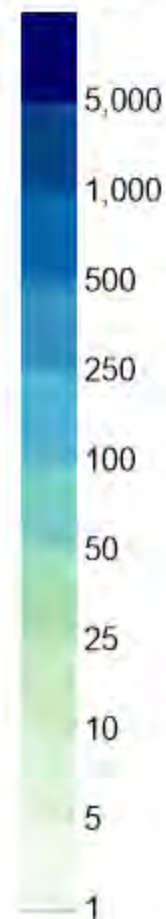
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges**
BUSINESS SOLUTIONS

Pentachlorophenol **2015**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **17.2 acres**
Plume Average Concentration: **9.0 µg/L**
Plume Mass Indicator: **2.5 lbs**

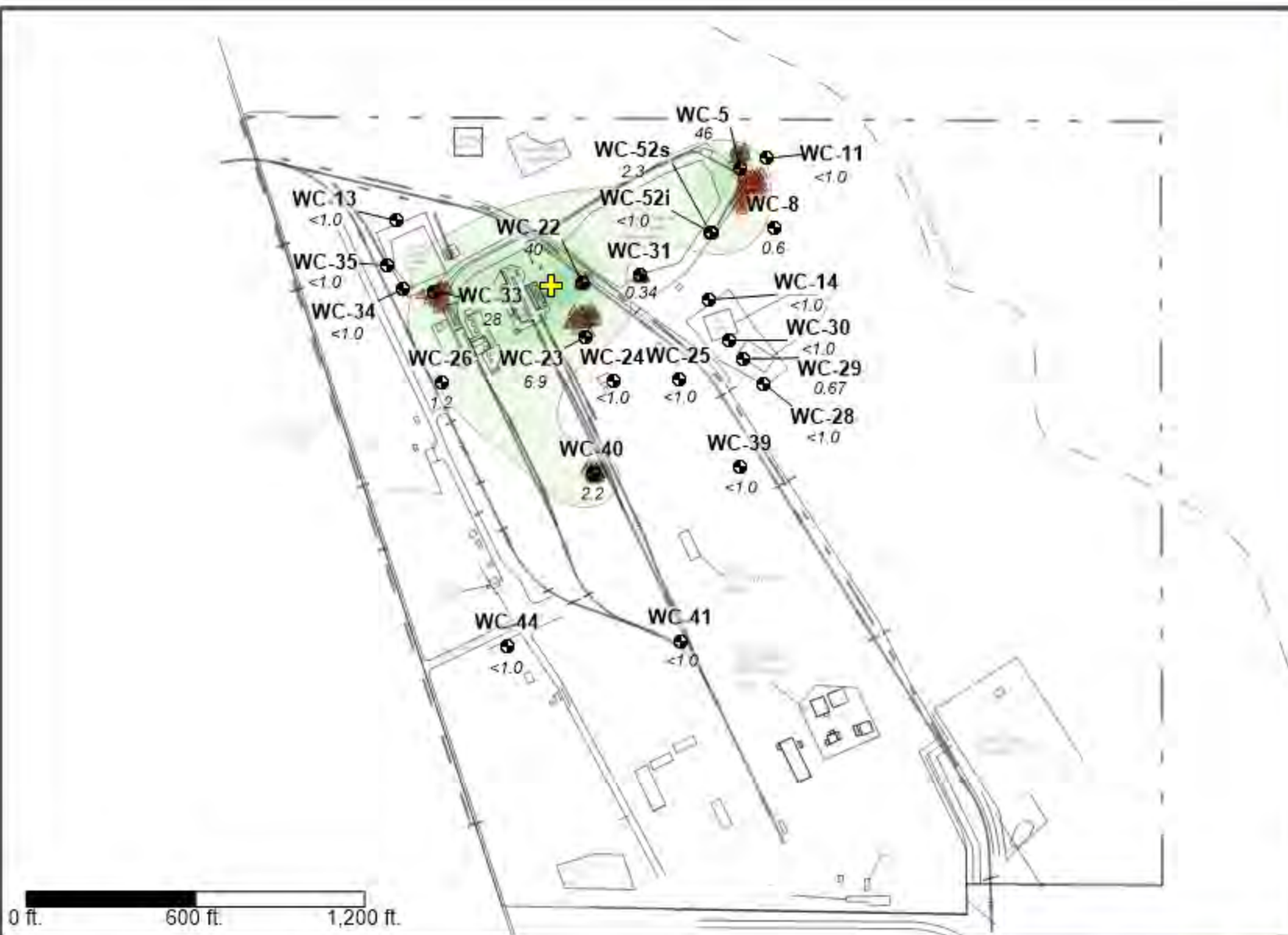
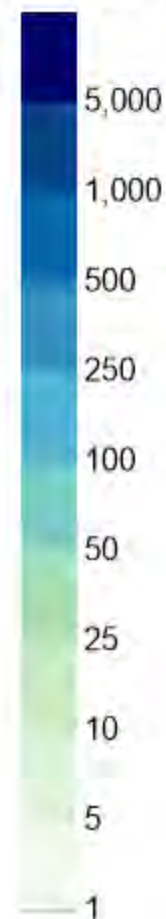
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol **2016**

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point

Plume Characteristics

Plume Area: **17.5 acres**
Plume Average Concentration: **6.6 µg/L**
Plume Mass Indicator: **1.9 lbs**

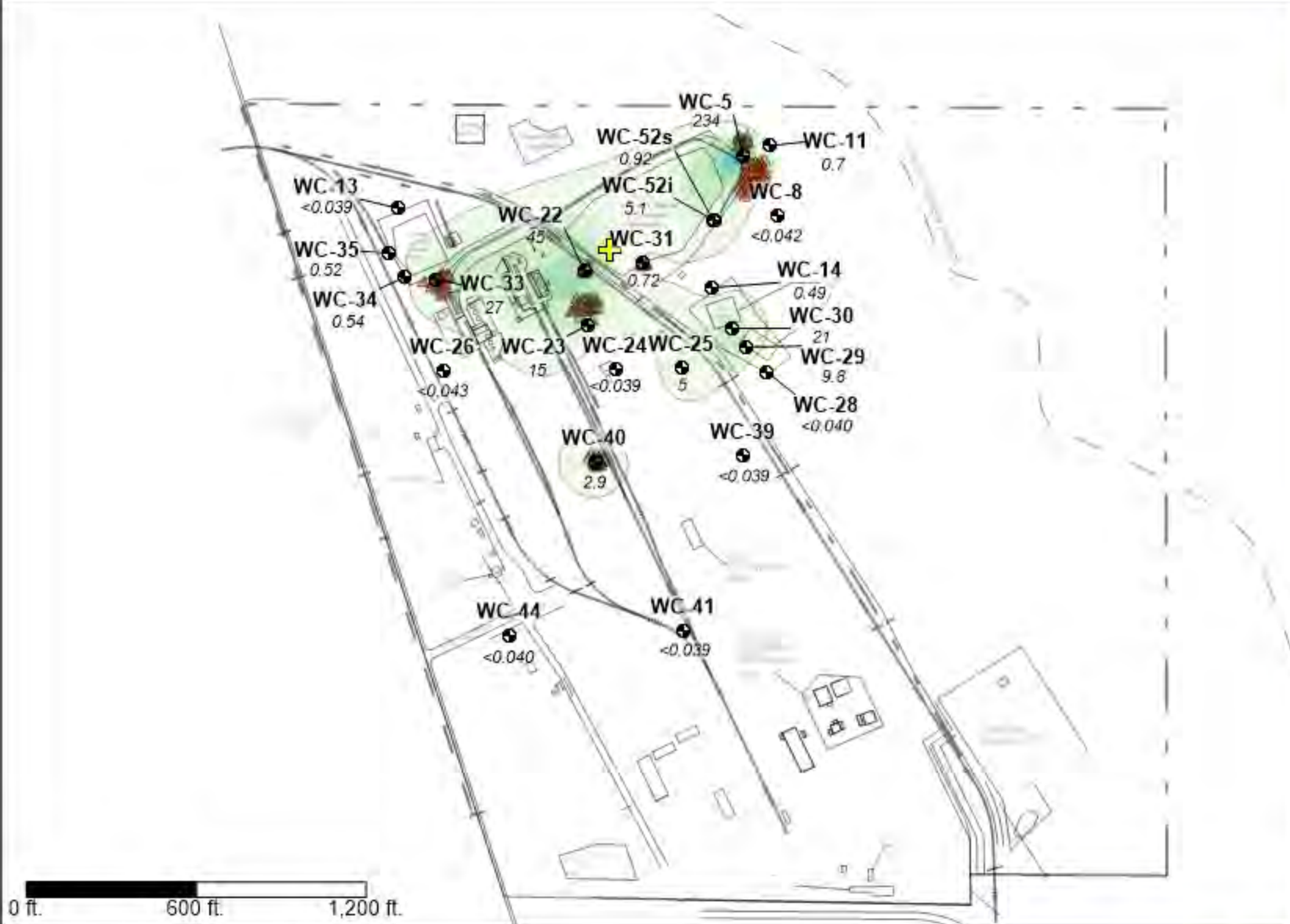
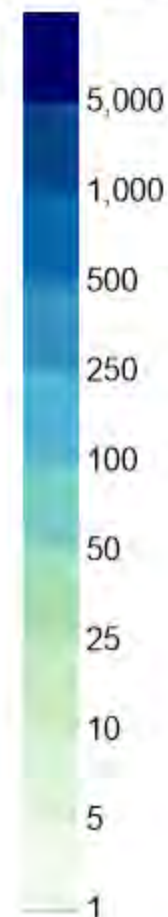
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 **Environmental Challenges BUSINESS SOLUTIONS**

Pentachlorophenol 2017

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

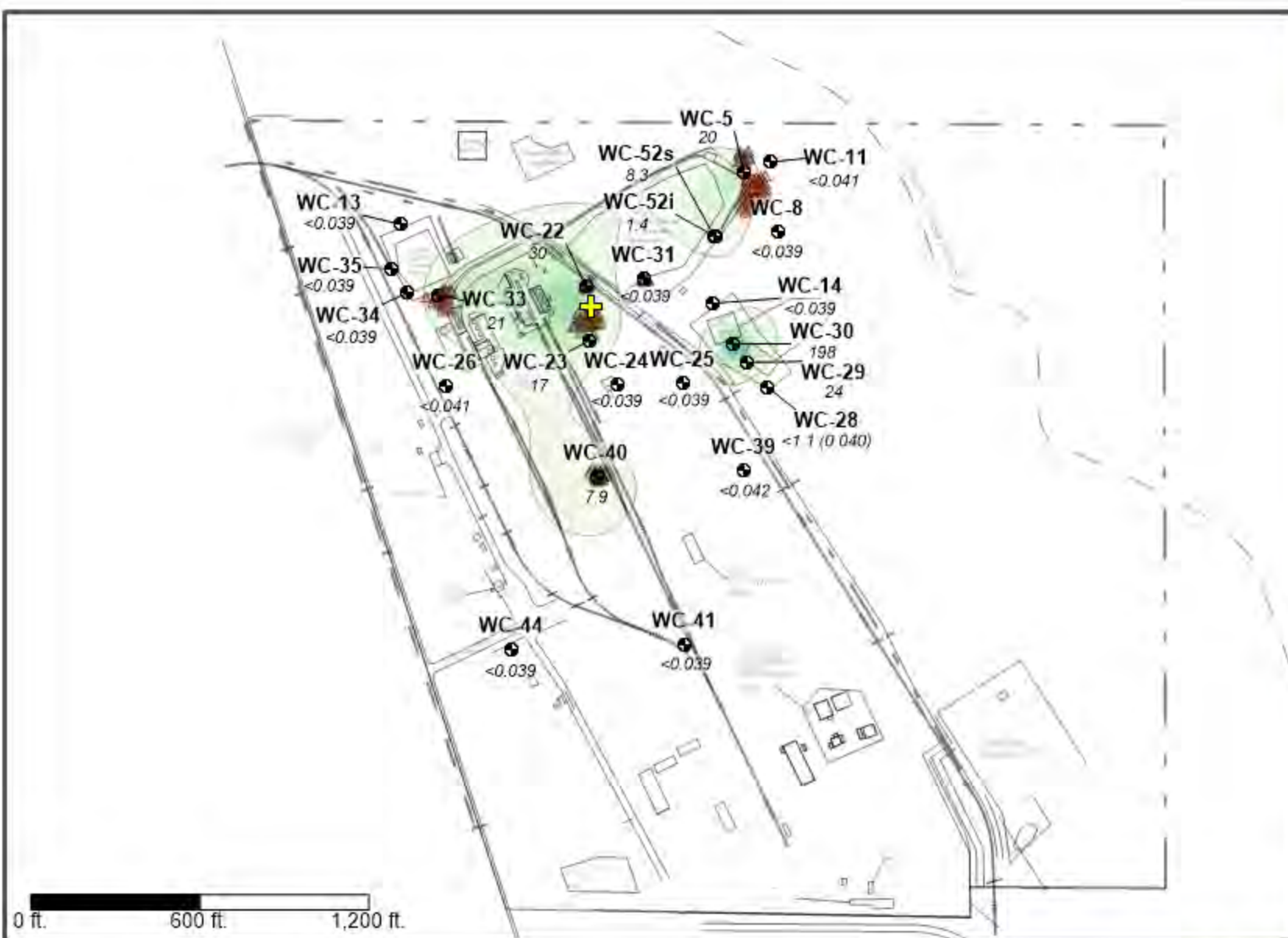
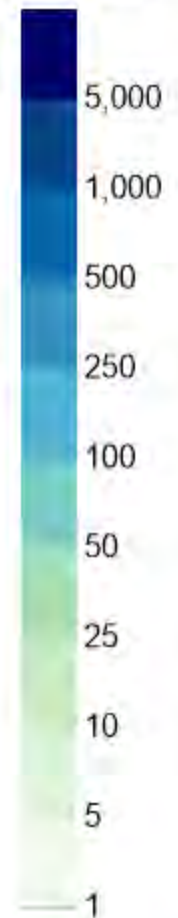
Plume Characteristics

Plume Area: **19.0 acres**
Plume Average Concentration: **7.6 µg/L**
Plume Mass Indicator: **2.3 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 Environmental Challenges
BUSINESS SOLUTIONS

Concentration (µg/L)

WC-B 5	Monitoring Well
123	Concentration (µg/L)
NS (145)	Well Not Sampled (Assigned Value Shown)
+	Plume Center of Mass
▲	2007 ISCO Injection Point
▲	2011 ISCO Injection Point

Plume Area: **15.7 acres**
Plume Average Concentration: **6.8 µg/L**
Plume Mass Indicator: **1.7 lbs**

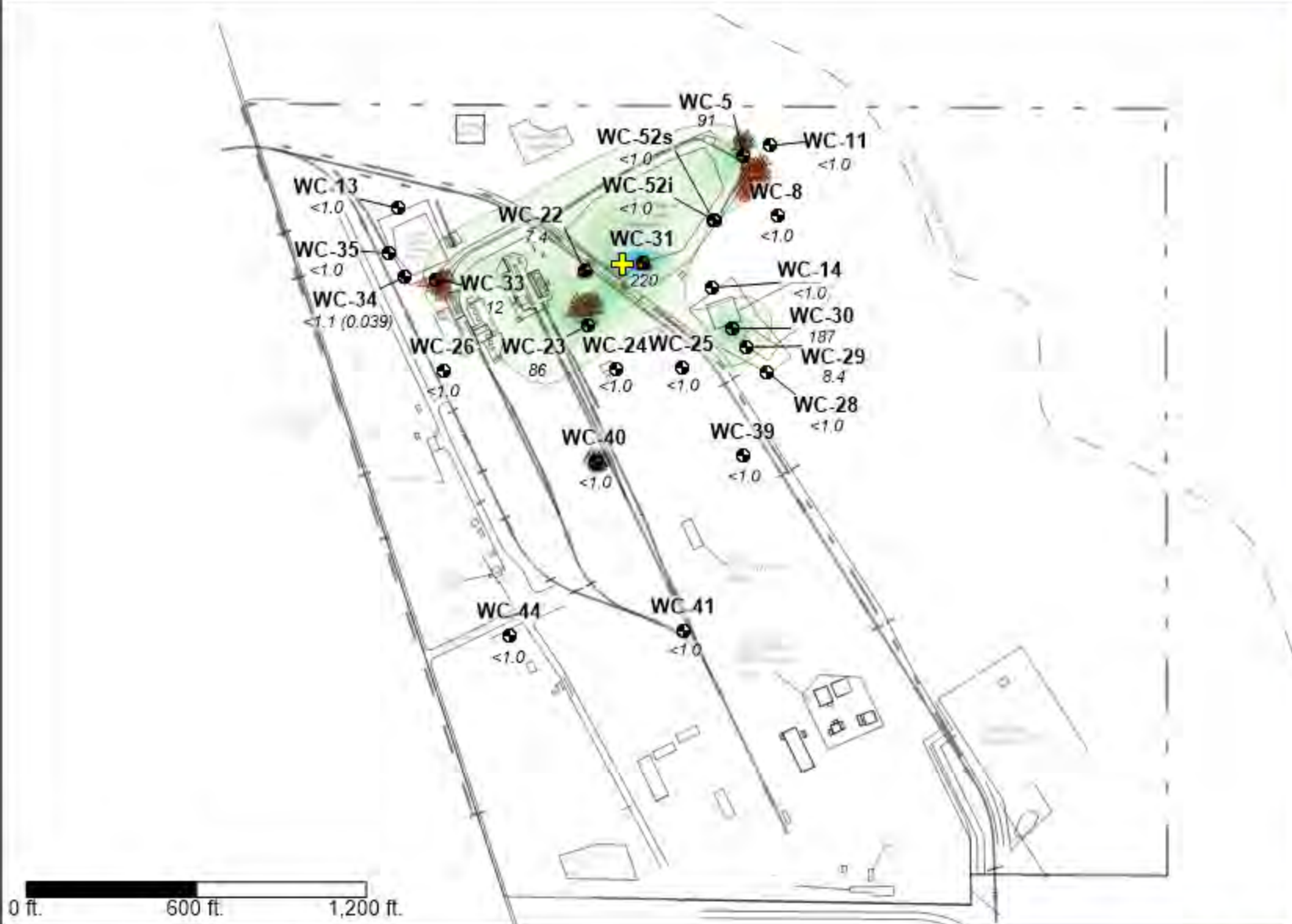
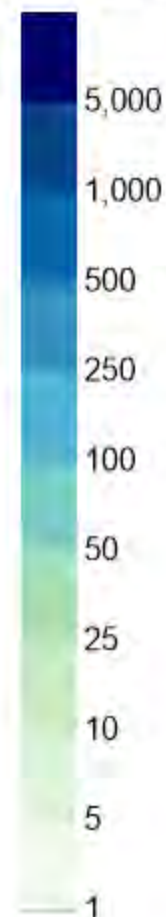
This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS

Pentachlorophenol 2019

Concentration (µg/L)



LEGEND

- WC-8 Monitoring Well
- 123 Concentration (µg/L)
- NS (145) Well Not Sampled (Assigned Value Shown)
- + Plume Center of Mass
- ▲ 2007 ISCO Injection Point
- ▲ 2011 ISCO Injection Point

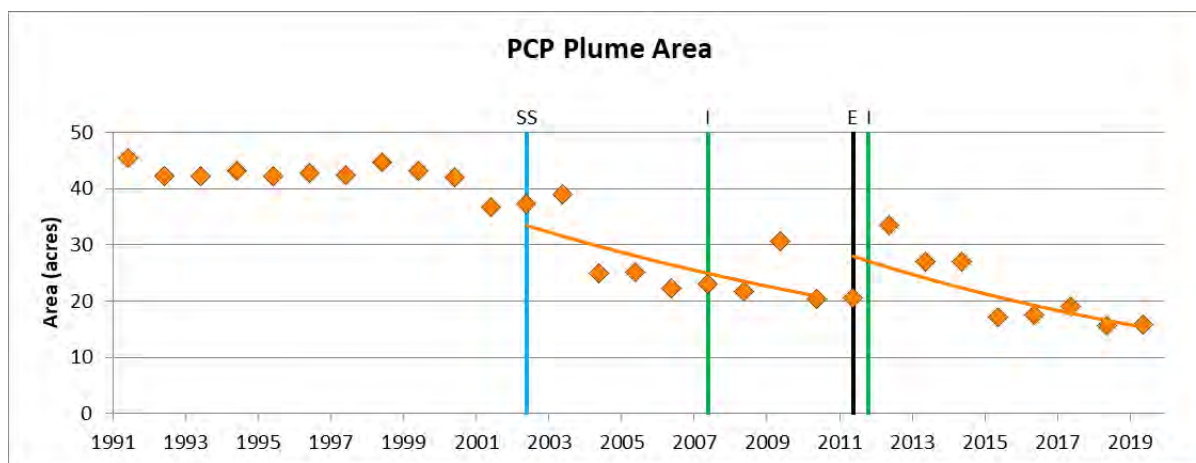
Plume Characteristics

Plume Area: **15.7 acres**
Plume Average Concentration: **11.3 µg/L**
Plume Mass Indicator: **2.9 lbs**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

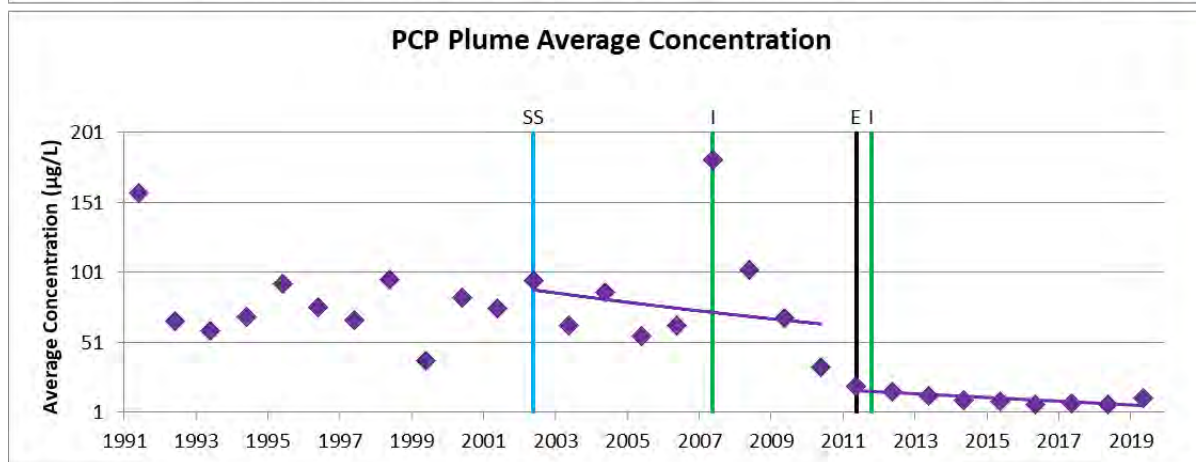


© EarthCon 2020 Environmental Challenges
BUSINESS SOLUTIONS



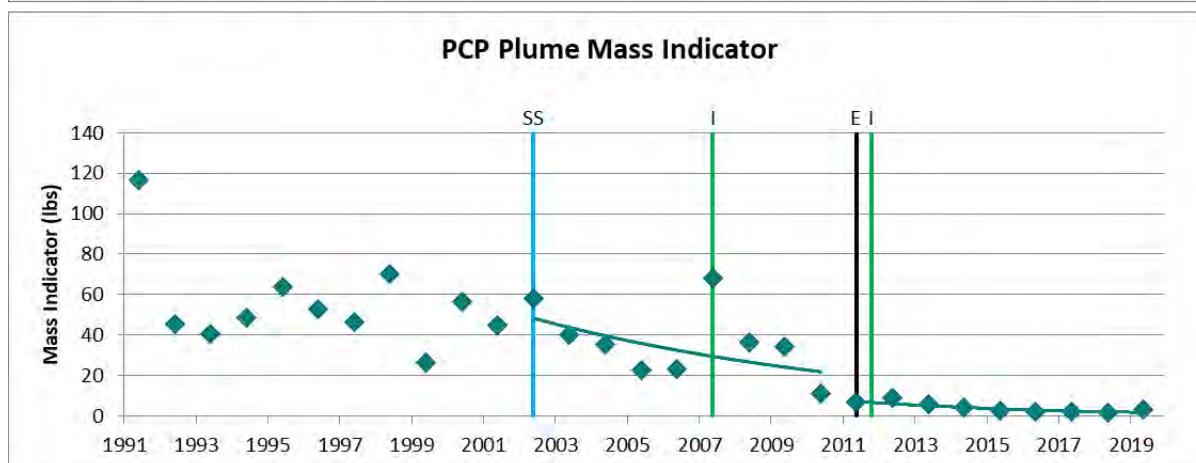
2002 to 2010
Decreasing Trend
Mann-Kendall: 98% Confidence
Regression: 95% Confidence

2011 to 2019
Decreasing Trend
Mann-Kendall: 99% Confidence
Regression: 98% Confidence



2002 to 2010
No Trend
Mann-Kendall: 62% Confidence
Regression: 45% Confidence

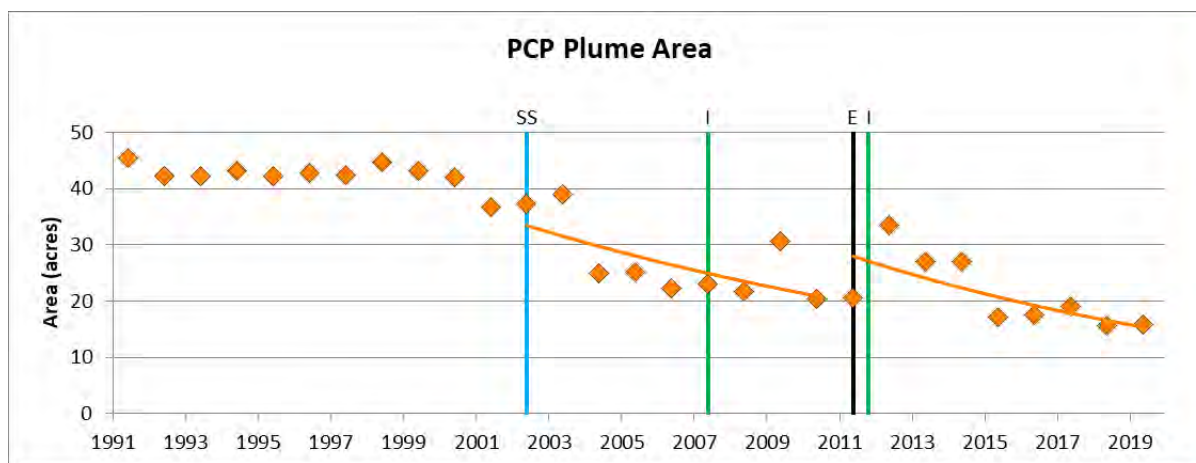
2011 to 2019
Decreasing Trend
Mann-Kendall: 99% Confidence
Regression: 99% Confidence



2002 to 2010
No Trend/Decreasing Trend
Mann-Kendall: 91% Confidence
Regression: 83% Confidence

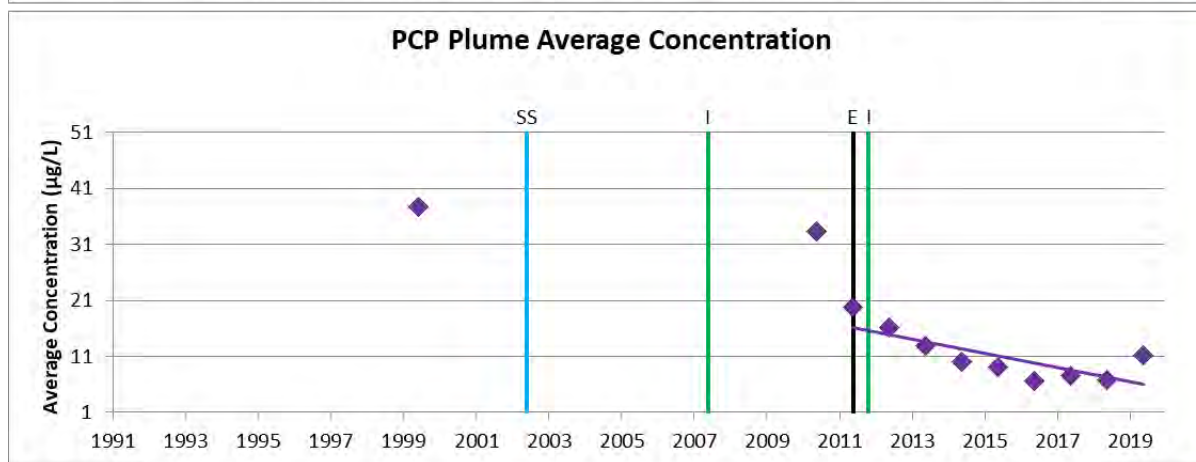
2011 to 2019
Decreasing Trend
Mann-Kendall: 99% Confidence
Regression: >99% Confidence

SS – System Shutdown
I – ISCO
E – Network Expansion



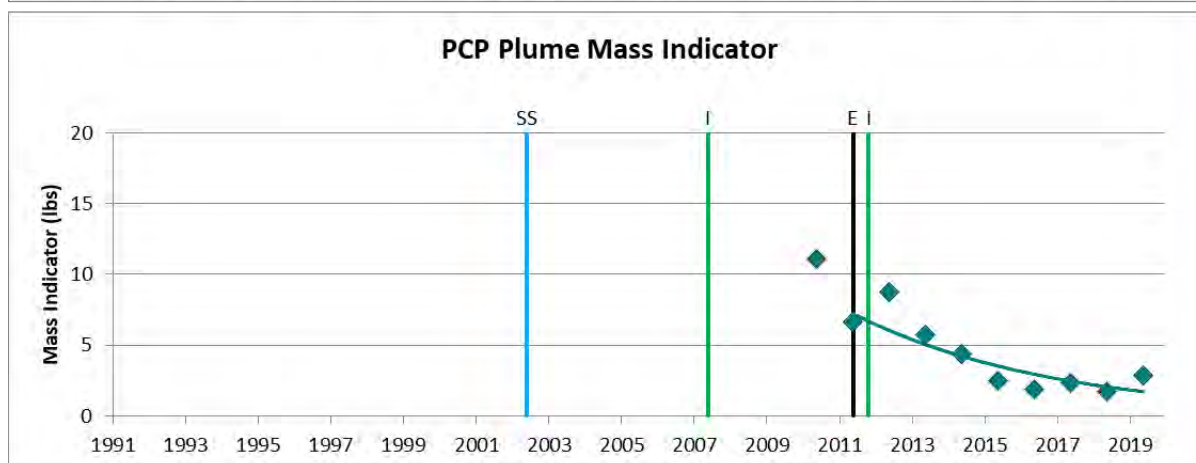
2002 to 2010
Decreasing Trend
Mann-Kendall: 98% Confidence
Regression: 95% Confidence

2011 to 2019
Decreasing Trend
Mann-Kendall: 99% Confidence
Regression: 98% Confidence



2002 to 2010
No Trend
Mann-Kendall: 62% Confidence
Regression: 45% Confidence

2011 to 2019
Decreasing Trend
Mann-Kendall: 99% Confidence
Regression: 99% Confidence

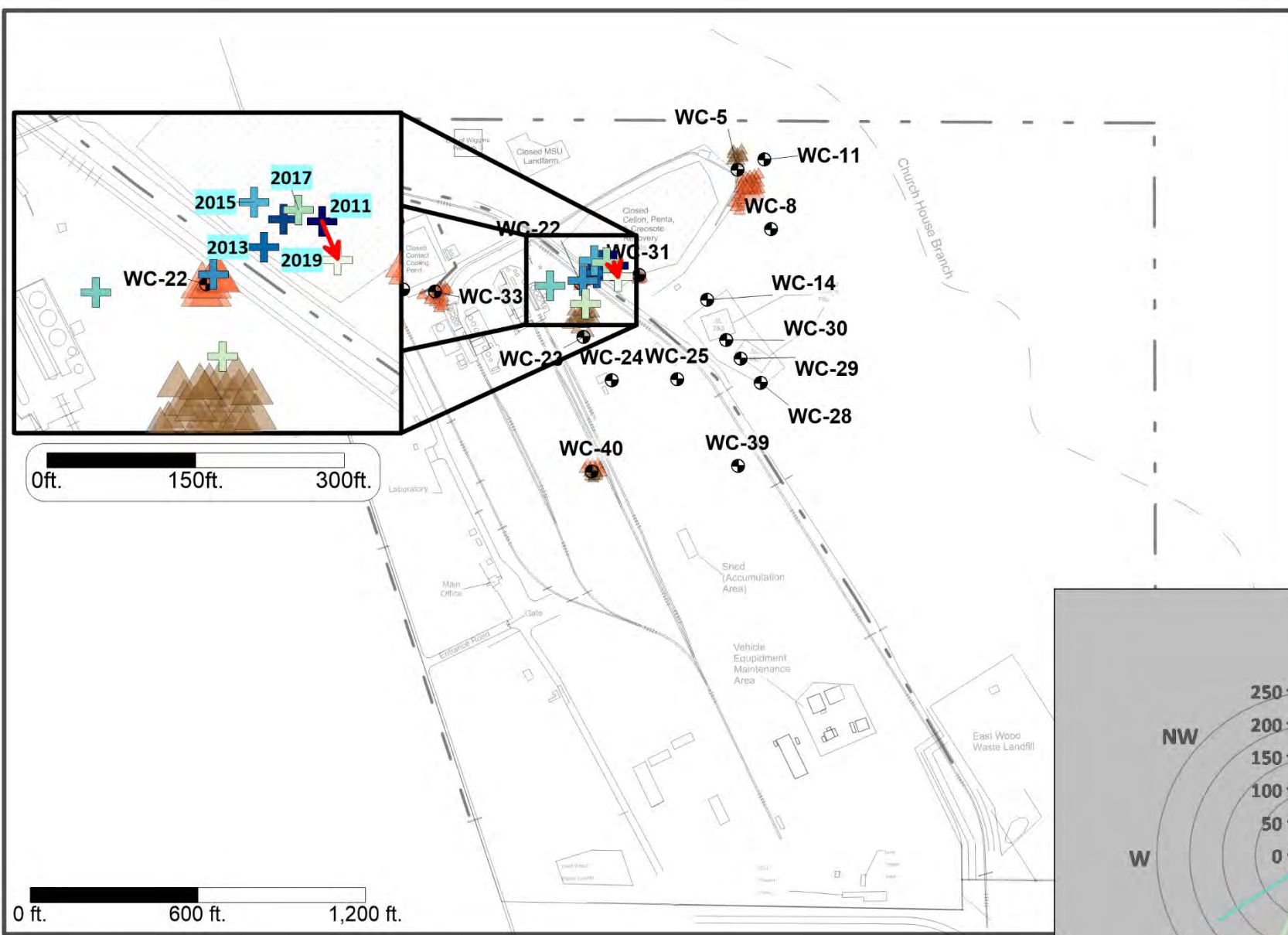


2002 to 2010
No Trend/Decreasing Trend
Mann-Kendall: 91% Confidence
Regression: 83% Confidence

2011 to 2019
Decreasing Trend
Mann-Kendall: 99% Confidence
Regression: >99% Confidence

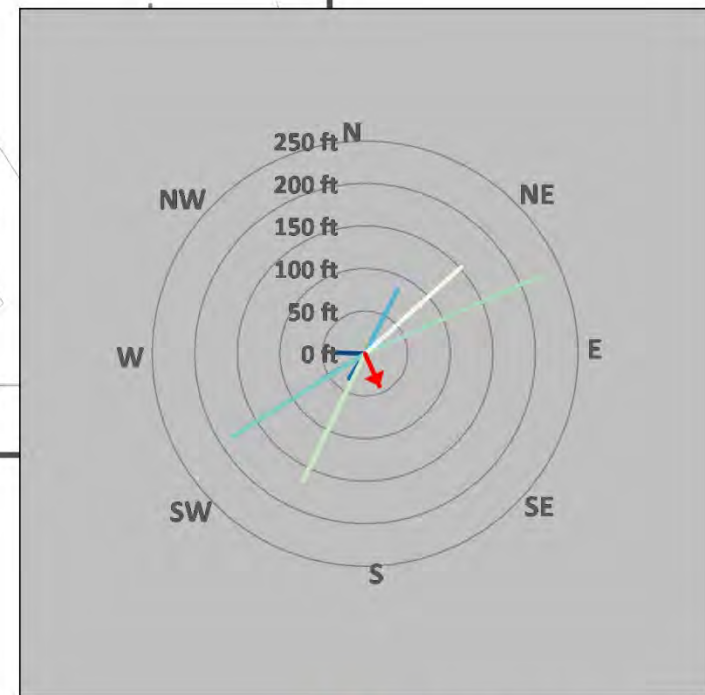
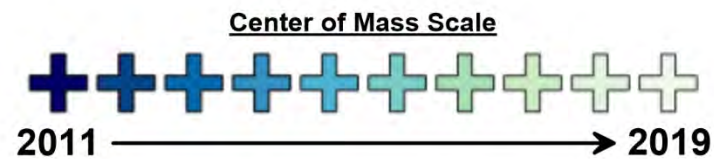
SS – System Shutdown
I – ISCO
E – Network Expansion

**Pentachlorophenol
Center of Mass**



LEGEND

- Monitoring Well
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- Center of Mass Movement
- Net Movement

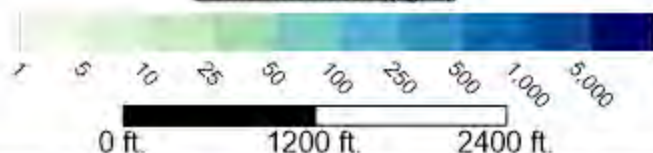


2011

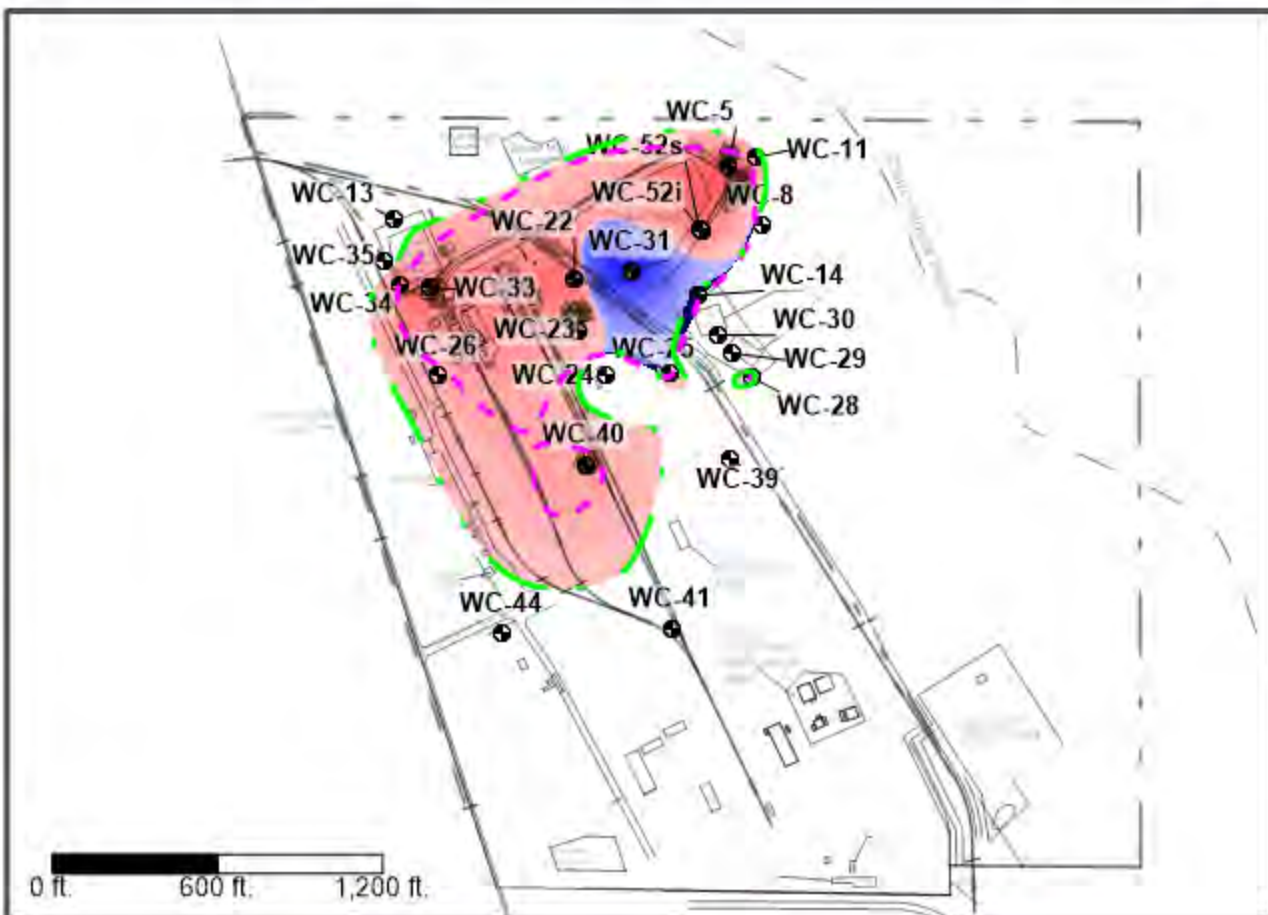
Pentachlorophenol

Plume Differences 2011 vs 2012

Concentration ($\mu\text{g/L}$)



2012



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2012 Plume Boundary

Plume Characteristics

Area: 62% Increase
 Average Concentration: 19% Decrease
 Mass Indicator: 32% Increase
 Mass Increase: 4.13 lbs Increase
 Mass Decrease: 2.01 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

EARTHCON
 Environmental Challenges
 BUSINESS SOLUTIONS

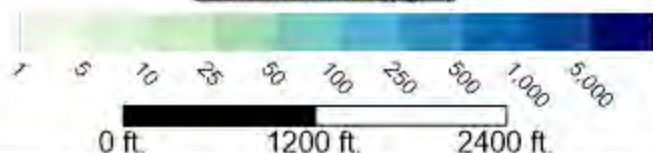
© EarthCon 2020

2011

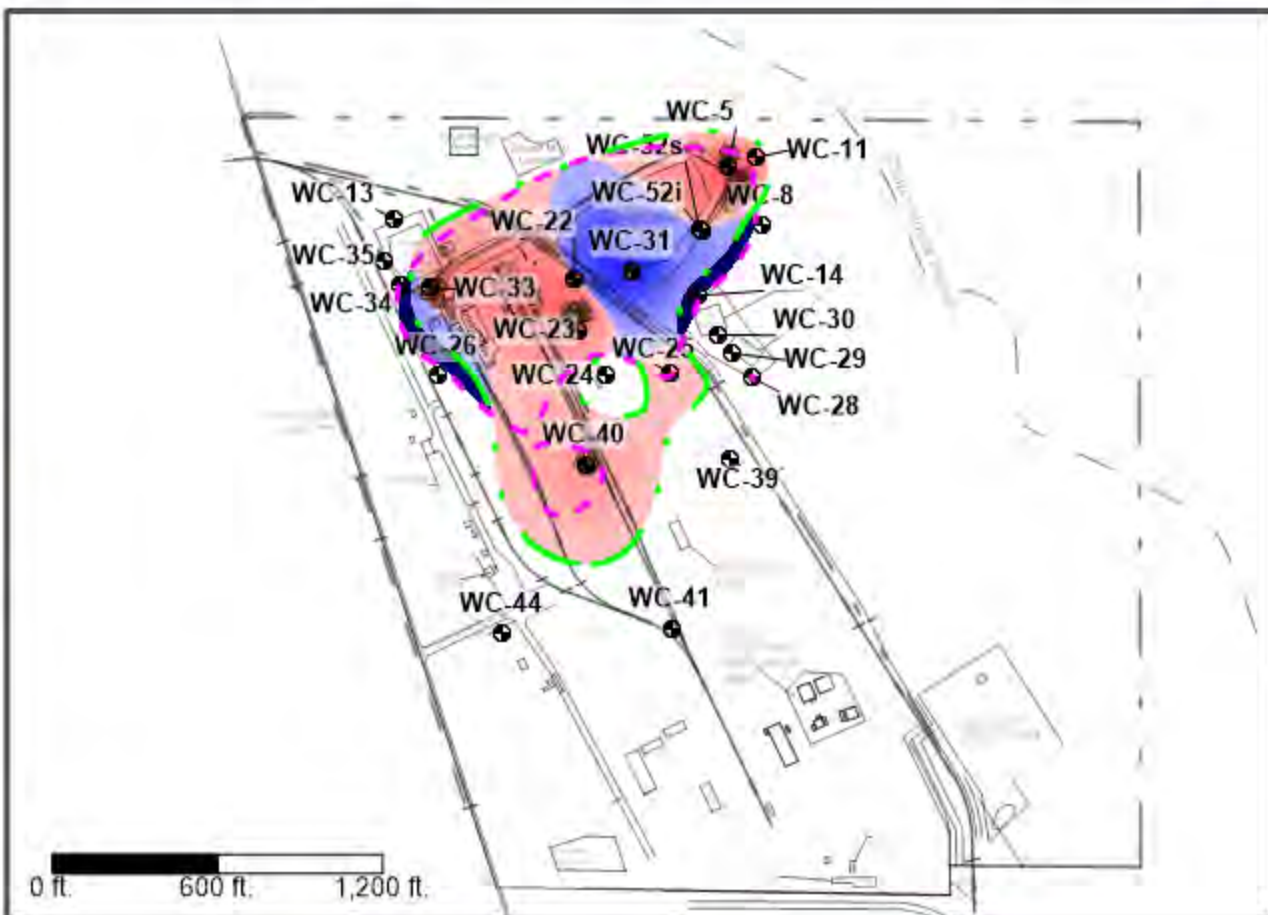
Pentachlorophenol

Plume Differences 2011 vs 2013

Concentration ($\mu\text{g/L}$)



2013



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2013 Plume Boundary

Plume Characteristics

Area: **31% Increase**
 Average Concentration: **34% Decrease**
 Mass Indicator: **14% Decrease**
 Mass Increase: **2.66 lbs Increase**
 Mass Decrease: **3.59 lbs Decrease**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



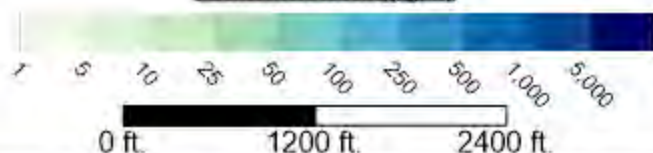
© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS®

2011

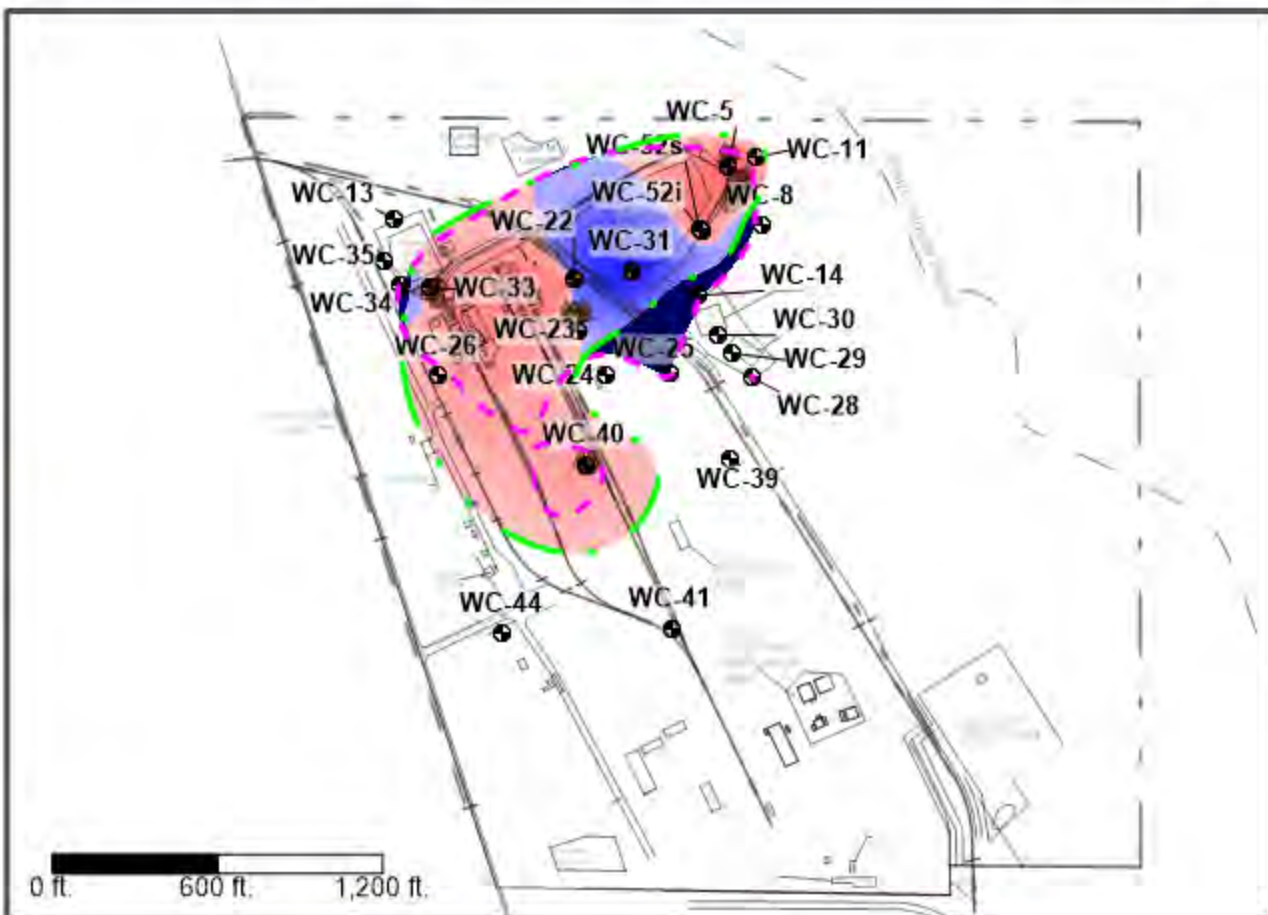
Pentachlorophenol

Plume Differences 2011 vs 2014

Concentration ($\mu\text{g/L}$)



2014



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2014 Plume Boundary

Plume Characteristics

Area: **31% Increase**
 Average Concentration: **49% Decrease**
 Mass Indicator: **34% Decrease**
 Mass Increase: **1.96 lbs Increase**
 Mass Decrease: **4.21 lbs Decrease**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Environmental Challenges
 BUSINESS SOLUTIONS®

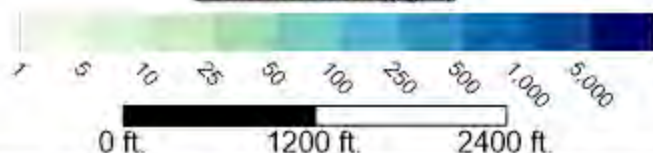
© EarthCon 2020

2011

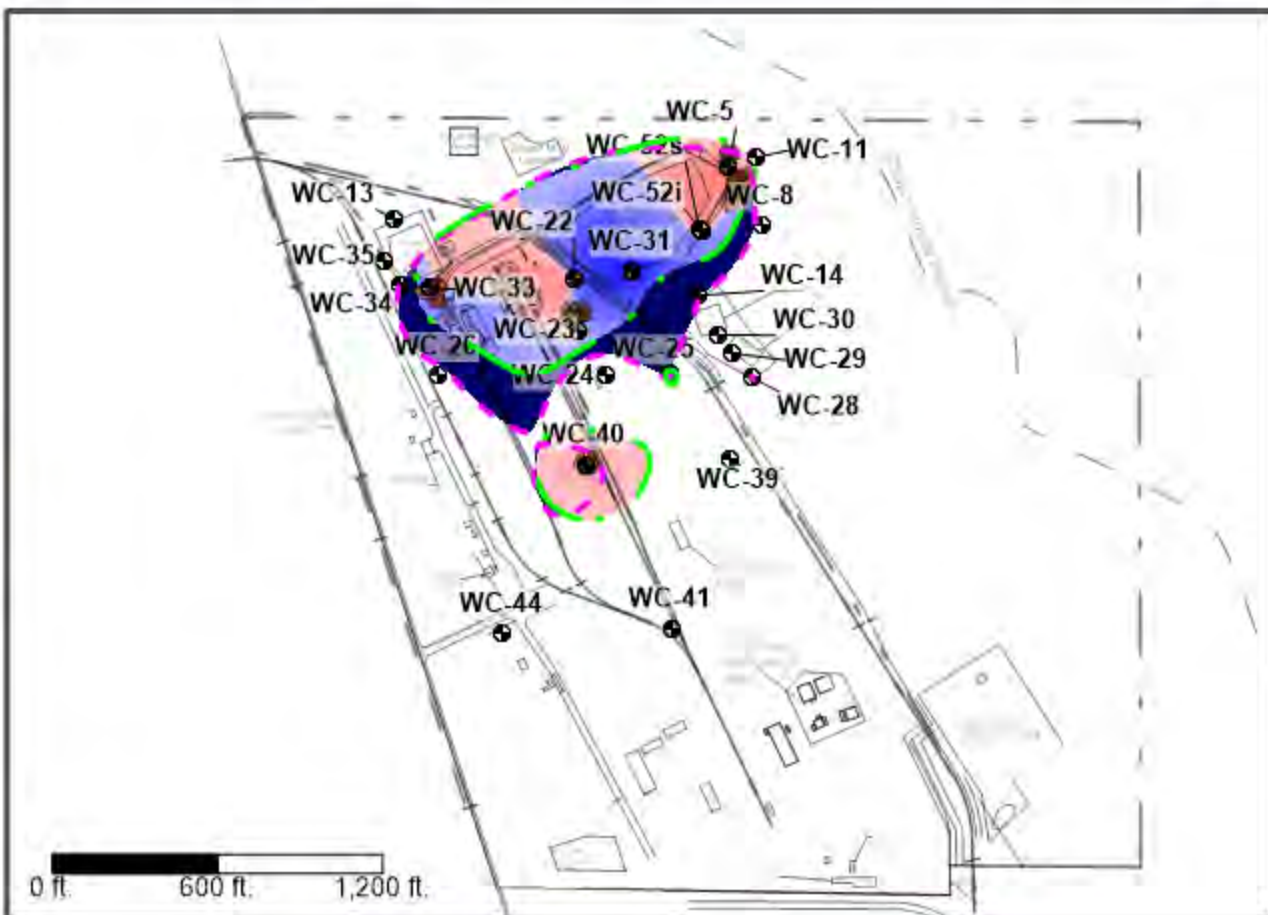
Pentachlorophenol

Plume Differences 2011 vs 2015

Concentration ($\mu\text{g/L}$)



2015



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2015 Plume Boundary

Plume Characteristics

Area: 17% Decrease
 Average Concentration: 54% Decrease
 Mass Indicator: 62% Decrease
 Mass Increase: 0.43 lbs Increase
 Mass Decrease: 4.55 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Environmental Challenges
 BUSINESS SOLUTIONS®

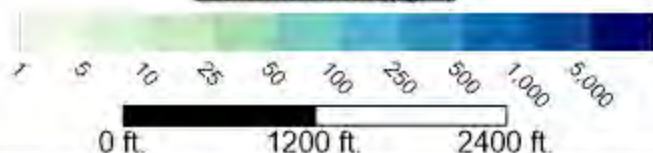
© EarthCon 2020

2011

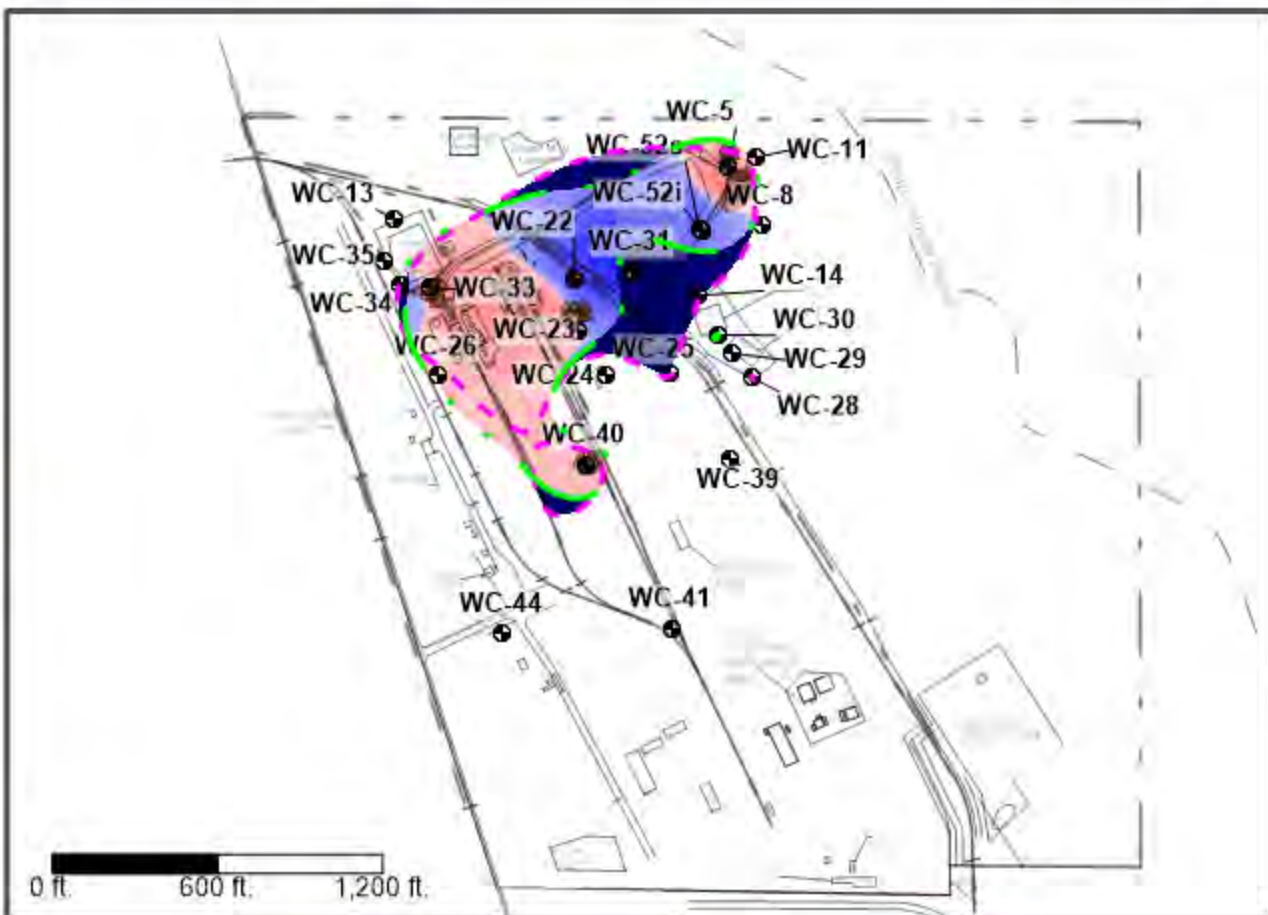
Pentachlorophenol

Plume Differences 2011 vs 2016

Concentration ($\mu\text{g/L}$)



2016



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2016 Plume Boundary

Plume Characteristics

Area: 15% Decrease
 Average Concentration: 67% Decrease
 Mass Indicator: 72% Decrease
 Mass Increase: 0.52 lbs Increase
 Mass Decrease: 5.29 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Environmental Challenges
 BUSINESS SOLUTIONS®

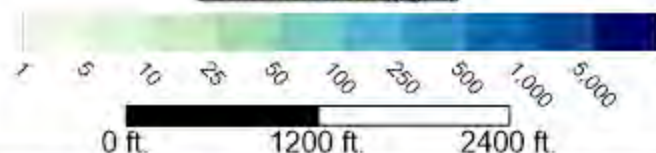
© EarthCon 2020

2011

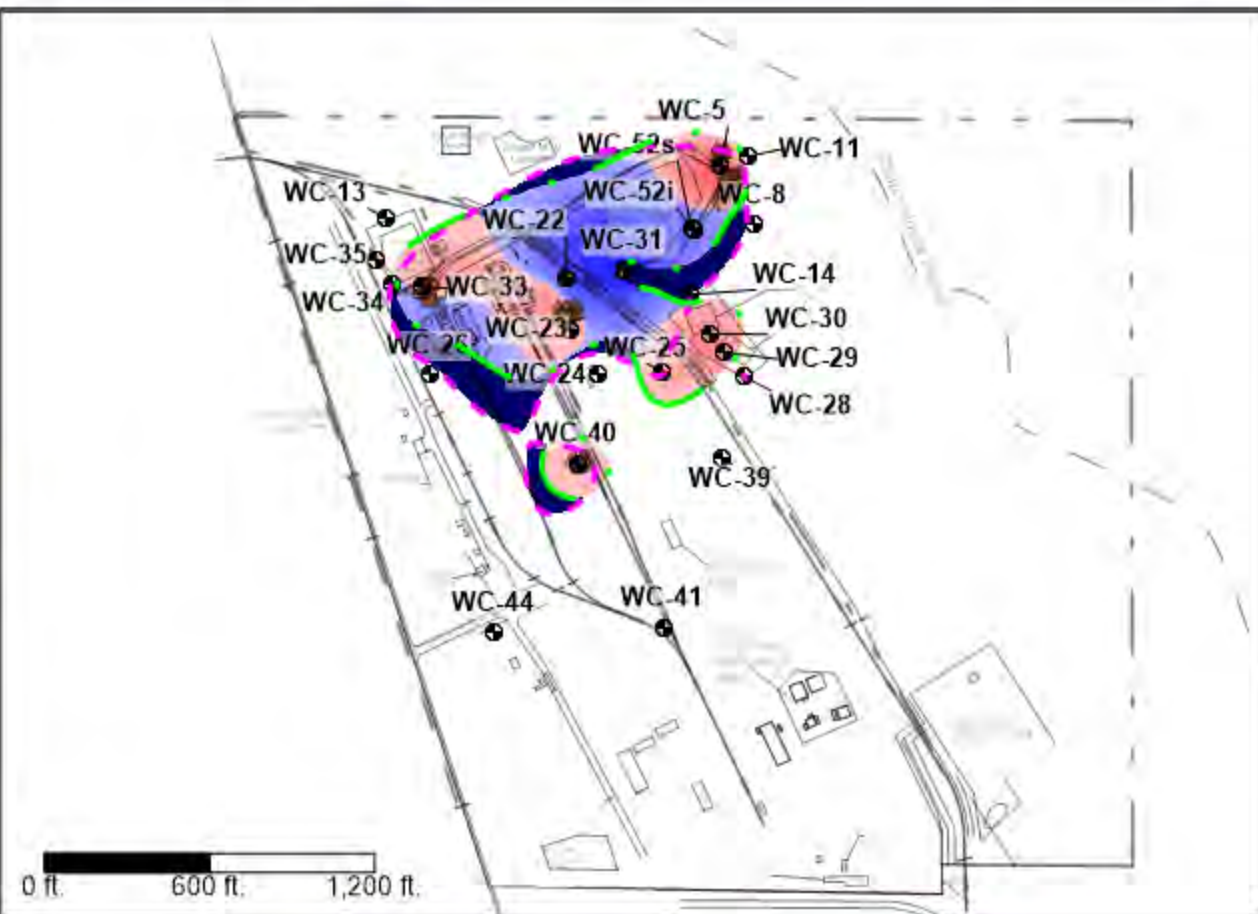
Pentachlorophenol

Plume Differences 2011 vs 2017

Concentration ($\mu\text{g/L}$)



2017



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2017 Plume Boundary

Plume Characteristics

Area: 8% Decrease
 Average Concentration: 62% Decrease
 Mass Indicator: 65% Decrease
 Mass Increase: 0.82 lbs Increase
 Mass Decrease: 5.12 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



Environmental Challenges
 BUSINESS SOLUTIONS®

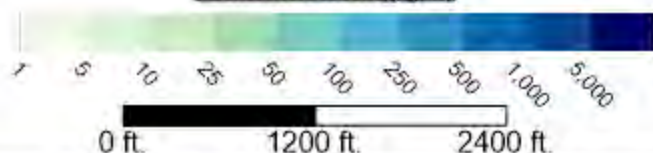
© EarthCon 2020

2011

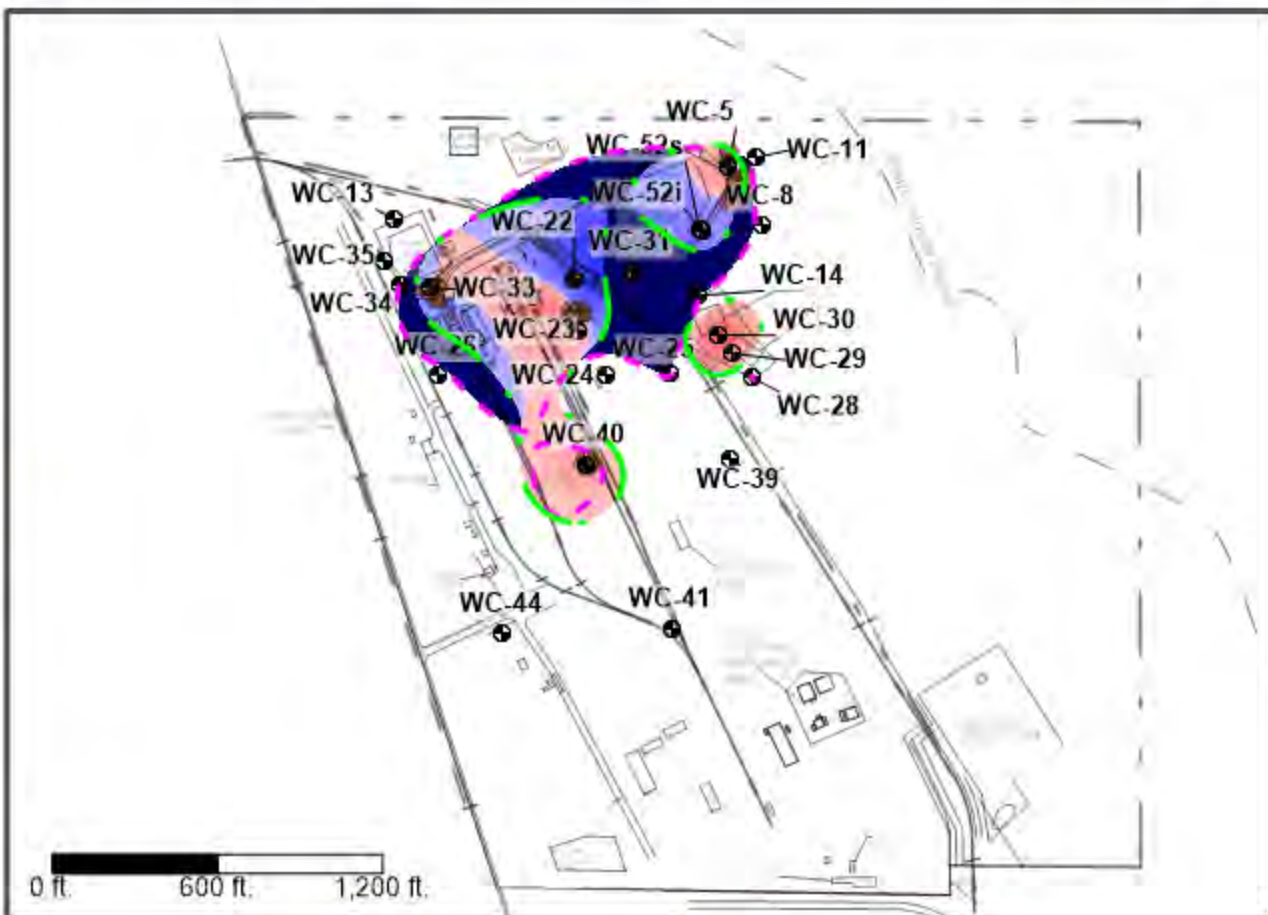
Pentachlorophenol

Plume Differences 2011 vs 2018

Concentration ($\mu\text{g/L}$)



2018



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2018 Plume Boundary

Plume Characteristics

Area: **24% Decrease**
 Average Concentration: **65% Decrease**
 Mass Indicator: **74% Decrease**
 Mass Increase: **0.60 lbs Increase**
 Mass Decrease: **5.50 lbs Decrease**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.



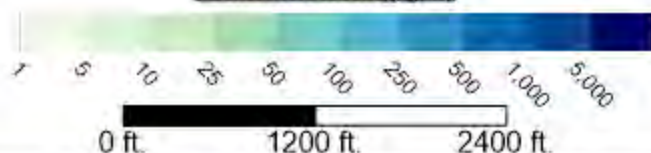
© EarthCon 2020 *Environmental Challenges*
BUSINESS SOLUTIONS®

2011

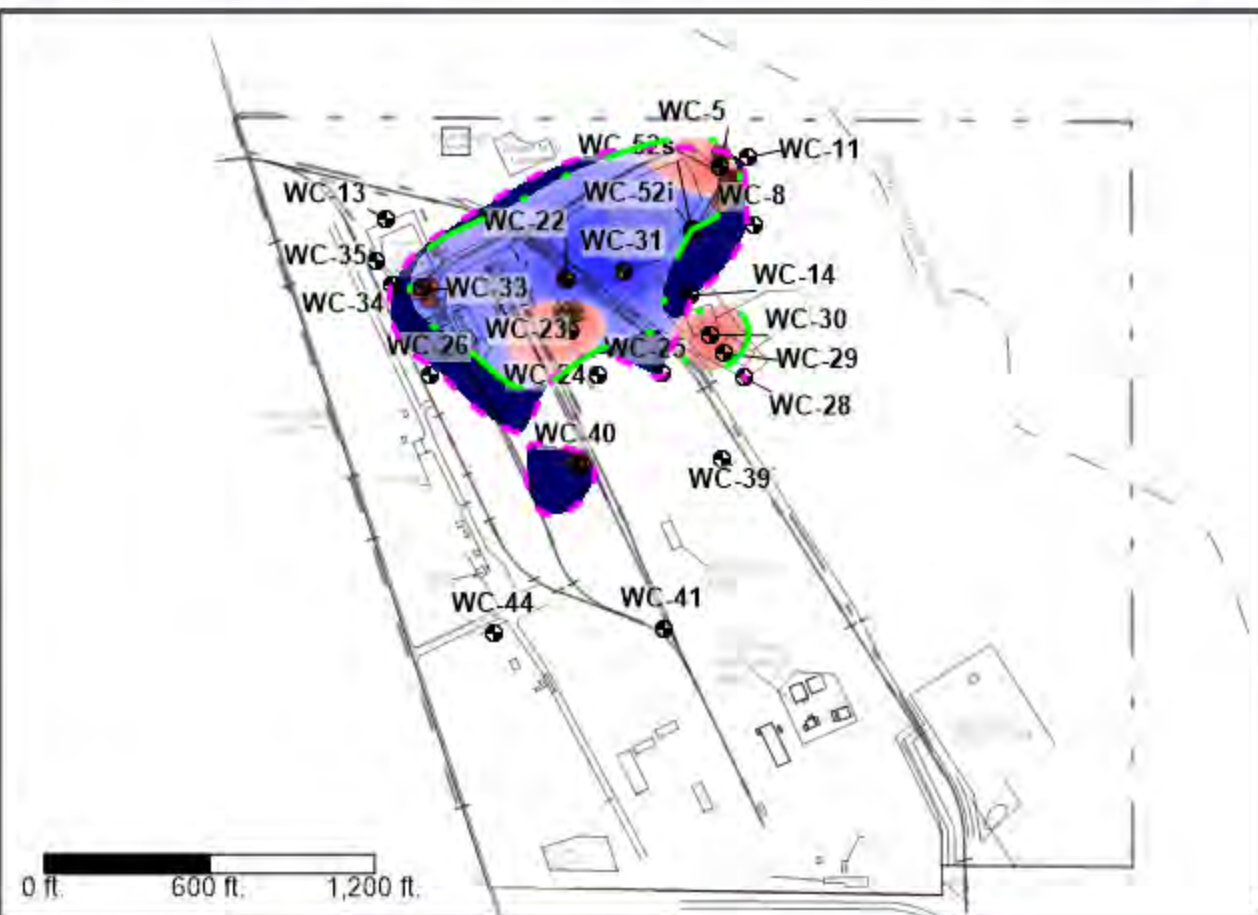
Pentachlorophenol

Plume Differences 2011 vs 2019

Concentration ($\mu\text{g/L}$)



2019



Spatial Change Indicator™



LEGEND

- WC-8 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2019 Plume Boundary

Plume Characteristics

Area: **24% Decrease**
 Average Concentration: **43% Decrease**
 Mass Indicator: **56% Decrease**
 Mass Increase: **0.66 lbs Increase**
 Mass Decrease: **4.41 lbs Decrease**

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

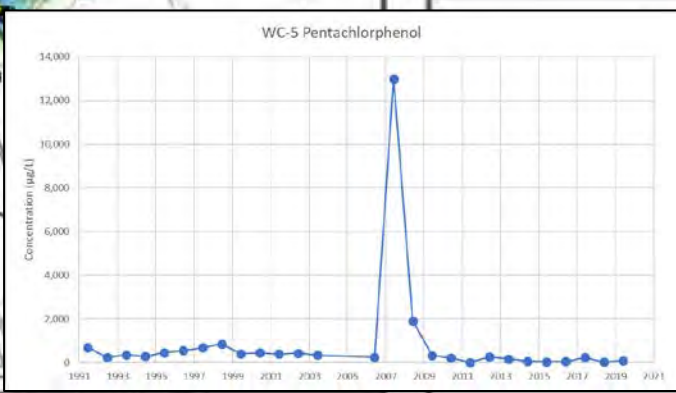
EARTHCON
 Environmental Challenges
 BUSINESS SOLUTIONS®

© EarthCon 2020

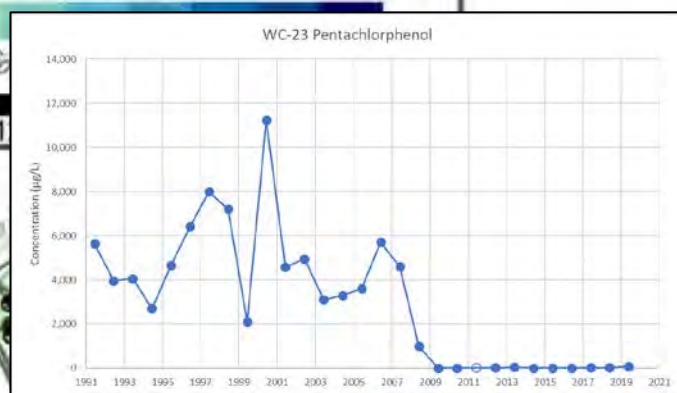
2011

Pentachlorophenol

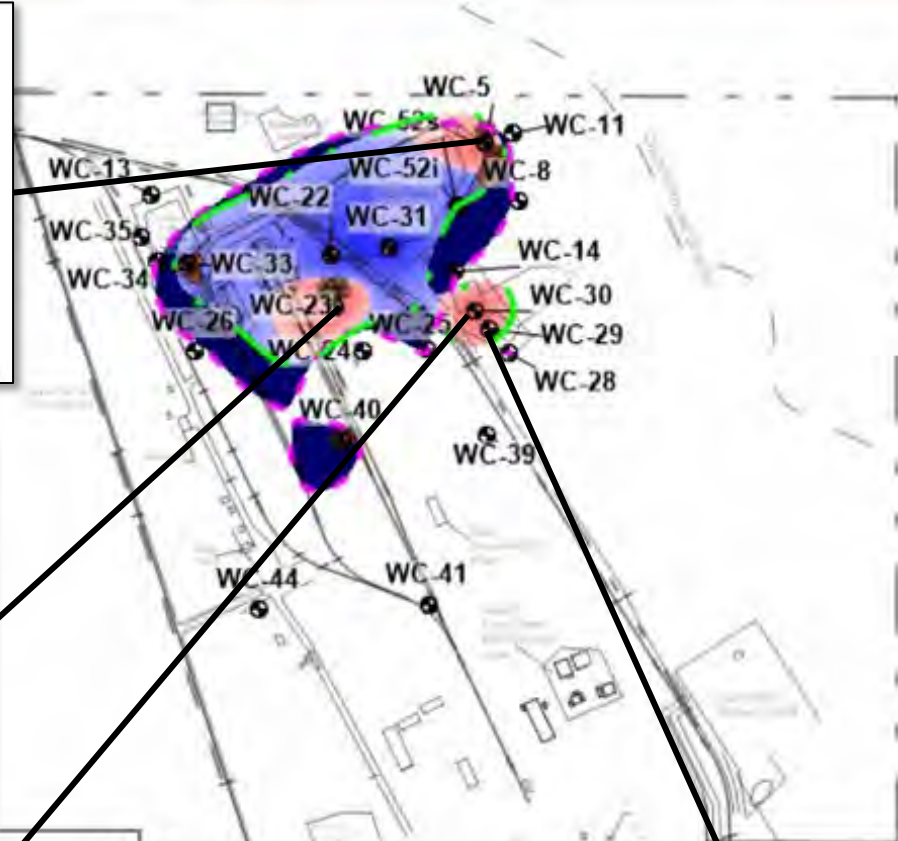
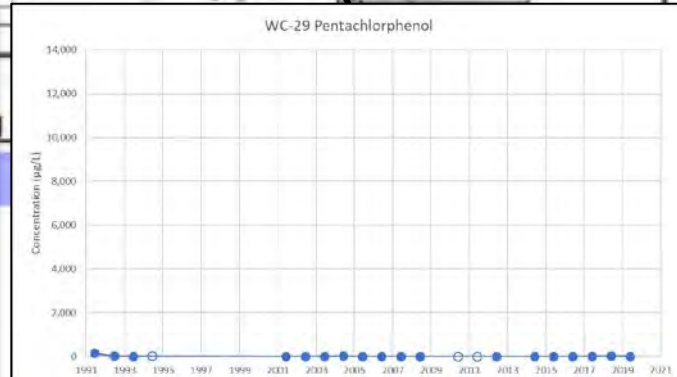
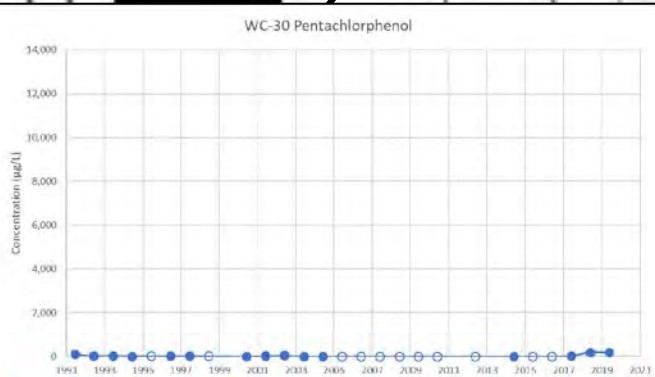
Plume Differences 2011 vs 2019



Concentration (µg/L)



2019



LEGEND

- WC-5 Monitoring Well
- Plume Center of Mass
- 2007 ISCO Injection Point
- 2011 ISCO Injection Point
- 2011 Plume Boundary
- 2019 Plume Boundary



Area: 24% Decrease
Average Concentration: 43% Decrease
Mass Indicator: 56% Decrease
Mass Increase: 0.66 lbs Increase
Mass Decrease: 4.41 lbs Decrease

This analysis requires fixed data points within a fixed area for the purposes of assessing relative changes of area, average concentration, and mass indicator over time. Therefore, any created isopleth maps are not intended to be a depiction or model of the actual plume but rather is meant to show conceptual behavior of the aforementioned metrics over time.

